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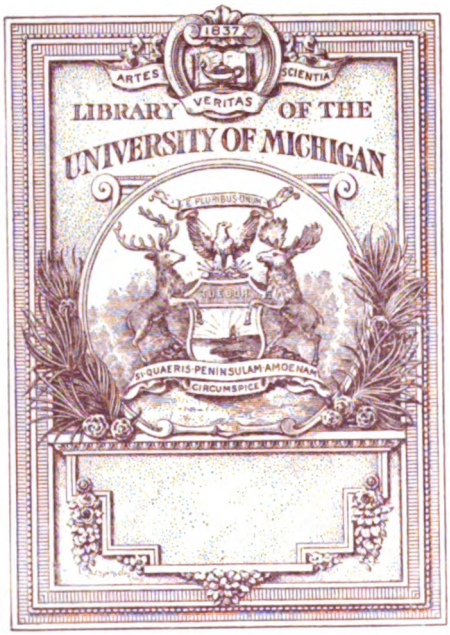

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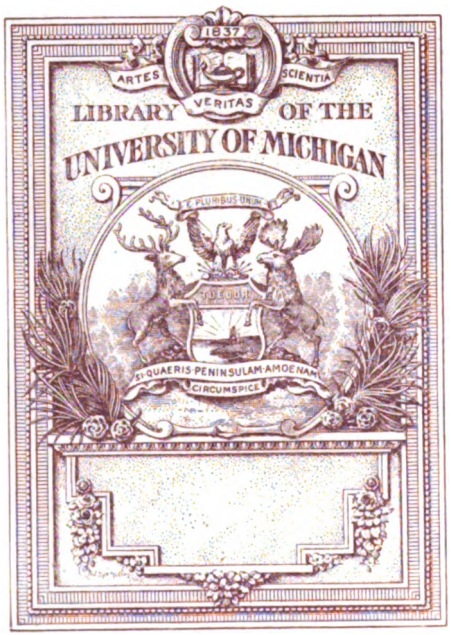

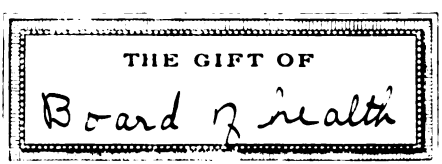

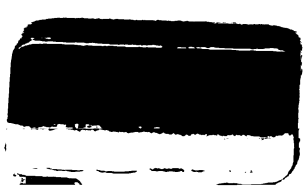

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SIXTEENTH REPORT

(EIGHTH BIENNIAL)

OF THE

STATE BOARD OF HEALTH

AND

VITAL STATISTICS

OF

MINNESOTA, 1895-96.

CONTAINING

REPORT OF THE WORK OF THE BOARD BY THE SECRETARY

WITH APPENDICES.

ST. PAUL, MINN.:
THE PIONEER PRESS COMPANY.
1898.

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OFFICE OF THE STATE BOARD OF HEALTH
AND VITAL STATISTICS,
ST. PAUL, MINN., Jan. 1, 1897.

To His Excellency, David M. Clough, Governor;

SIR: I have the honor to transmit herewith the report of the work of the State Board of Health and Vital Statistics for the period of two years, from Jan. 1, 1895, to Jan. 1, 1897. It includes:

First—The report of the work of the board by the secretary.

Second—The financial statement of the board.

Third—Statistics of glanders in the state.

Fourth—Records of the use of malline.

Fifth—Record of the use of tuberculin.

Sixth—Statistics of work of the inspector of live stock at New Brighton, Minn.

Seventh—Statistics of inter-state notifications of infectious disease.

Eighth—Statistics of immigrants exposed to infectious disease en route to Minnesota.

Ninth—Graphic charts, showing the comparative mortality in Minnesota, from diphtheria, enteric fever, tubercular disease and diarrhœal diseases of children.

The "Fifth Biennial Report," by the secretary, on "Vital Statistics of the State of Minnesota," for the years 1894 and 1895, is published separately.

Very respectfully, your obedient servant,

CHARLES N. HEWITT,
Secretary and Executive Officer.

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MEMBERS OF THE STATE BOARD OF HEALTH AND VITAL STATISTICS.

FRANKLIN STAPLES, M. D., President,	Winona.
HENRY HUTCHINSON, M. D., Vice President,	St. Paul.
CHARLES N. HEWITT, M. D., Secretary and Executive Officer,	Red Wing.
F. F. WESBROOK, M. D., Bacteriologist,	Minneapolis.
P. H. MILLARD, M. D.,	St. Paul.
WM. J. MAYO, M. D.,	Rochester.
CHAS. F. MCCOMB, M. D.,	Duluth.
HENRY M. BRACKEN, M. D.,	Minneapolis.
HENRIK NISSEN, M. D.,	Albert Lea.

All official correspondence should be addressed to the Secretary, the executive officer of the Board, 515 Pioneer Press Building, St. Paul, Minn.

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REPORT OF THE SECRETARY FOR THE YEARS 1895 AND 1896.

I respectfully submit the following report of the work done by the board for the years 1895 and 1896:

The public health service of Minnesota consists of the state board of health and 1,782 local boards (40 in cities, 3 in boroughs, 333 in villages, and 1,400 in townships). In addition to these there are 22 village boards which are in direct communication and coöperation with the state board that have made no reports.

The duties of the state and local boards, as prescribed by law, are mutually interdependent and helpful. Their relations are defined chiefly in chapter 132, Laws of 1883, as amended. The value of this association has been amply demonstrated by experience, both in every-day work and in emergency.

Besides its work within the state, the state board early found it necessary to obtain information as to the existence of infectious diseases beyond our borders, and the danger to which our population might be exposed from them. This danger is of two general sorts: First, from other states, and, second, from other countries, both through travel and immigration. To forfend as far as possible the first danger, importation from other states, your secretary, in 1879, proposed an agreement between state boards of health for mutual notification of such diseases. This plan was finally adopted by other state boards in 1886, and has been in partial operation since.

Full details of this agreement will be found in Appendix 5, secretary's report, fourteenth report of this board.

The difficulty, then and now, is, that, while in Minnesota notification of infectious disease is obligatory by local boards to the secretary of the state board, it is not so for most of the other states, and therefore their state boards have no immediate and accurate knowledge of the local existence of infectious diseases within their borders.

I am glad to report that other states are gradually following the example of Minnesota, and as their number increase so will the value of the notification. Eighty-seven reports have been received in 1895-96 from twenty-one states, reporting the existence of smallpox (in Appendix I.)

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But our greatest danger from without has been the importation of infectious disease in the clothing, baggage, and persons of emigrants from beyond the United States.

In 1886 this board made vigorous efforts to secure the seacoast notification from New York harbor, but failed. In 1889 and 1891 the immigration bureau of the treasury department was established. Your secretary immediately made a request, through the marine hospital service, to the secretary of the treasury, April 13 and June 10, 1891, and on the 24th of June of that year the first notification of infectious disease from the general government to the board of health of an interior state was sent to Minnesota from New York, and has gone on uninterruptedly since. (For history of the arrangement, see Appendix 5, Fourteenth Report, 1891 and 1892.)

The second arrangement was made with the quarantine service of the Dominion of Canada. The result has been that in 1895 and 1896 forty-six notifications have been received from New York, seven from Canadian quarantine, and two from other seaports of the United States, covering 464 persons who have been exposed to infectious disease, with their number, date of arrival, form of disease, and destination in Minnesota. These notifications have been sent from this office to localities concerned, and a large number of the persons reported subjected to inspection on arrival. (See Appendix II.)

I think the time has now arrived to make this notification more complete, and advise that this board take measures to that end.

WORK WITHIN THE STATE.

Of the population of the state, about sixty per cent live in townships and villages of less than 1,000 population. Most of this population is in townships whose board of supervisors is the local board of health.

There are very few medical men resident in townships, so that the chairman of the board is the acting health officer, and reports directly to the secretary of the state board for advice and assistance. These chairmen are, with their boards, elected every year, in March, and they are immediately furnished with a full file of the publications of the state board respecting their work.

In March, 1896, 61.24 per cent of the chairmen were re-elected, which means that about 550 new chairmen had to be instructed in the duties of their office, and this is about the usual number of new chairmen elected each year. During the years 1895 and 1896 there were sent to the chairmen of the township boards nearly 100,000 circulars of instruction, copies of laws, and blanks for reports.

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More than one-half of the population of the state live in townships where a large proportion of preventable diseases and deaths occur, so that the duties of these boards are very important, and all the more difficult because the population is a scattered one.

For these reasons the relations of the chairmen and your secretary have become very constant and intimate.

During the years 1895 and 1896 the correspondence with them included 986 letters about diphtheria, 431 as to scarlatina, 827 as to glanders, 51 as to rabies, 1,462 as to infectious diseases of swine, and 1,010 on miscellaneous topics.

There have been reported by letters, outbreaks and cases of diphtheria and scarlatina as follows:

SCARLATINA, 1895.

Outbreaks	96
Localities	84
Counties	41
Cases	244
Deaths	8

SCARLATINA, 1896.

Outbreaks	62
Localities	57
Counties	39
Cases	196
Deaths	8

DIPHTHERIA, 1895.

Outbreaks	204
Localities	173
Counties	59
Cases	553
Deaths	75

DIPHTHERIA, 1896.

Outbreaks	233
Localities	181
Counties	61
Cases	663
Deaths	114

I beg to repeat the quotation from my report of two years ago, because continued experience has only increased the force of the statement:

The Need for Nurses in Townships—Nurses trained to the care of infectious diseases are not to be had, and those of the average sort find better wages, accommodations and facilities in villages and cities, so that they are difficult to secure in townships even for greater wages than poor people can, or local boards are willing, to pay. I am sure that those who ought to supply this grievous need are not aware of its extent or importance. I can give many

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illustrations of it from the pitiful appeals of chairmen to the state board for *any nurse* who can do something to lighten the burden of the mothers of families stricken with diphtheria (for example) who are utterly unable properly to care for them. Add to this, lack of roomy houses, and proper food or cooking, and frequent deaths, with no help except what the chairman and others can give on the outside of the house, and one can form an idea of conditions repeatedly paralleled in the experience of township boards of health. Infectious diseases prevail largely among children, and commonly in the families of newcomer farmers, with scarcely any accommodations or knowledge for their care, able to speak only their own language and ignorant how to apply for help or what to ask for.

No one who has any knowledge of the facts can charge this lack of efficient and sufficient nursing to any want of neighborly feeling or to heartless disregard of the needs of others, for it would be unjust and untrue. There are none, or very few, unemployed women in any farming community; all are busy and many find little time for social enjoyment, much less for the prolonged isolation which the nursing of the sick of infectious disease always demands. Mothers of families have to consider the danger to their own children which such services to others involve under the peculiarly difficult circumstances here referred to, so that it is not difficult to account for the lamentable fact that proper nursing is often wanting in country districts.

I have repeatedly called the attention of the board and of the public to this subject, and I should fail in a very important part of my duty did I neglect any opportunity to impress upon all churches and Christian people to examine into this need and help to supply it.

Common humanity and public safety demand that no time be lost in making the needful arrangments for providing a supply of competent women nurses, willing to serve in the care of infectious diseases in country districts, and arranging, in part at least, for their compensation.

It must not be forgotten that the need for this aid varies exceedingly. Sometimes we could use a half dozen in a single township; at other times we do not know where to use one. But, as we have no supply, the demand is mostly from those in despair of other help, while if it was known that a supply was available, I am sure the deserving calls would exceed it.

How to Prevent the Spread of Infection in Families. Isolation Houses—Buildings plainly furnished belonging to one or several adjacent townships and available as places of refuge for *well* children of a family in which infectious disease appears, would be of inestimable advantage and the means of limiting the victims to the first attacked.

This is proved by the fact that we have the record of many outbreaks (of diphtheria, for example) in which the removal of the *well* children to the family of a relative or friend where were none, or grown-up children, has saved them from the disease and enabled the mother to devote her attention to the sick exclusively, to the mutual advantage of sick and well. The home in this way becomes a hospital from which all but the sick and attendants are excluded, and to which any other of the children taken sick can be immediately returned. The result has repeatedly been that there was but one, or possibly two, sick where if all had remained at home all would have probably taken the infection. This removal to a place of safety in another family is, unfortunately, rarely possible. Such a building as is needed would cost

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but a few hundred dollars. The furnishing need be only a few iron bedsteads, some chairs and a small cook stove; all the rest would come from the home of the family affected, as would caretaker, food and other necessaries. In case the family were a town charge this arrangement would be cheaper than to care for the same children *sick* at home.

Despite the difficulties incidental to their organization, limited term of service and consequent inexperience, some of the most efficient sanitary service in the control of infectious disease has been done by farmers,—chairmen of township boards of health,—as above demonstrated. This steady advance of these boards through the activity of their chairmen is perhaps the most noteworthy fact in the working of the state public health service for the past two years.

LEGISLATION FOR TOWNSHIP BOARDS.

I repeat the suggestion that this board ask the legislature to so adjust the law that the township boards be chosen for one, two and three years, so that there may be always upon the board two members whose experience is at least two years. I believe this would materially increase the efficiency of these boards, not only for public health work, but for the other duties which belong to them.

Clerks of townships are required by law (chapter 114, Laws of 1887) to make a monthly report of births and deaths to the secretary of the state board. Fortunately eighty-four per cent of these officers are re-elected, and some of them serve for a long term of years.

CITY AND VILLAGE BOARDS OF HEALTH.

About forty per cent of the population of the state reside in cities of over 1,000 inhabitants, twenty-one per cent in cities of St. Paul and Minneapolis, and nine per cent in other cities of over 5,000 population. The cities of St. Paul and Minneapolis have a health commissioner. Thirty-eight other cities have a board of health with a medical man as health officer. Of the 358 villages and boroughs in the state, 336 have boards of health, and all but thirty-four have physicians as health officers. In these thirty-four laymen are acting as health officers until a medical man can be found to serve.

I must repeat the statement of several preceding reports, that it is difficult to maintain the organization of boards of health in the smaller villages, because of the indifference of local authorities and their disinclination to provide for current expenses.

Of the 342 physicians who are now serving as health officers in cities, villages and boroughs, but two receive over $2,000 salary per annum, one receives $1,000, two receive $300, and much the larger proportion receive not over $20 a year, while more than half receive no salary at all. I repeat the recommendation of my last report.

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Legislation Needed—The facts ought to secure legislation for the following purposes:

1. To fix the compensation of health officers of villages and cities so that it may be sufficient to induce a capable physician to accept and perform the duty, and that he may know what is to be his income as he now knows, in the language of the law, what are his duties.

2. A definite provision for the current expenses of the health officer and a contingent fund for the emergency of sudden infectious disease.

3. To define the executive machinery for the removal of nuisance or regulation of offensive trades, and provide for the various duties connected with the management of infectious diseases. All these duties are now obligatory, but the means for their performance are at fault or in dispute.

4. To secure the local independence of health officers, in matters of official opinion and action, in dealing with infectious diseases.

5. It is very important that the legislature make some general provision to remedy these defects in a law which is in most respects a model. (Chapter 132, section 4, Laws 1883.)

VITAL STATISTICS.

My fifth biennial report is ready for the printer. I have abstracted from my studies of nine years the facts of mortality from enteric fever, diphtheria, diarrhœal diseases of children, and tubercular diseases for the years 1894 and 1895 and the average of nine years. The facts are arranged as per cent of all deaths and the ratio of deaths to 100,000 population for classes of population, for sex, for age, for parent nativity and for monthly mortality. No returns of a similar character have been furnished by any other state. They condense the evidence of our own statistics for a series of years, and have been prepared after the correction of the individual returns by correspondence with the attending physicians and in every other practicable way. (Appendix III.)

The report upon vital statistics includes all the information derived from the returns for the last two years and for the average of nine years.

There has been a steady decline in the mortality from diphtheria for the nine years. The mortality was but 494 for 1894 and 466 for 1895. The deaths to population were 29.6 to 100,000 in 1895 and 43.9 for the average of nine years. This reduction has been steady from the beginning, year by year.

The use of antitoxine as a remedy for diphtheria is increasing, and its success seems very encouraging. I am satisfied that its prophylactic use will prove of equal or greater importance than its curative influence, and respectfully urge the board to encourage observations in this direction, especially in the state institutions for children.

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The deaths from enteric fever were, in 1895, 36 to 100,000 population, against the average of nine years of 42.5. The greatest prevalence in 1896 was in Duluth. In this city there were 103 deaths up to the 1st of December. Of these 51 occurred in January, 19 in February, 12 in March, and in no other one month were there over 5 deaths from this cause.

During these eleven months there were from typhoid fever 49 deaths in St. Paul, 61 in Minneapolis and 143 in localities of less than 5,000 population.

No other disease has been markedly prevalent during these years.

INFECTIOUS DISEASES OF DOMESTIC ANIMALS.

During 1895 and 1896 tuberculin has been used for the diagnosis of tuberculosis, and every effort made to increase its use. Three thousand one hundred and eighty-five doses of tuberculin have been issued from this office. Of 2,975 animals tested 182, or 6.27 per cent were condemned. Of these animals tested 2,472 were in St. Paul; 113, or 4.6 per cent, were condemned. (See Appendix IV.)

Legislation Advised.—It seems advisable that an examination of all herds of dairy cows furnishing milk for butter, cheese, or domestic consumption should be made. Tuberculin for such examination should be furnished by the state board of health, and used under the direction of the local boards. Condemned animals should be killed under inspection. The question of permitting carcasses lightly affected to be used for food will bear consideration.

The mortality from tuberculosis in dairy herds costs the dairyman many times the amount incurred in carrying out the use of the tuberculin test.

GLANDERS.

Five hundred and seven horses have been reported as suffering from glanders. Of these 317 have been killed. The disease is diminishing because of closer inspection. Mallein furnished free from this office is being more generally used. (See Appendix VI.) Glanders is introduced very largely from adjacent states into the border counties. (See Appendix V. and VI.)

SWINE PLAGUE.

This was first reported in October, 1894. It was immediately reported to the bureau of animal industry, and a special inspection asked for and granted. Your secretary accompanied the inspector for two weeks of personal investigation. The disease was found to be swine plague, and not hog cholera. In December, 1894, this board

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regulated traffic on the railroads and restricted slaughter. One hundred and two outbreaks have been investigated and 13,678 deaths reported. This is much less than the actual number.

Legislation Needed.—First—Authority to permit infected herds to be sent immediately to slaughter, where inspection is made by the United States inspector. This will save the total loss of large numbers.

Second—A better arrangement for interstate inspection by the United States bureau of animal industry.

Third—Better coöperation from adjacent states. The local board, who have abundant power to act, object to taking any active quarantine measures against these infectious diseases among animals because of the expense, and also because of the difficulty in adjusting the claims for damages set forth by owners of such condemned stock.

As instructed by the board, on the 30th of October, 1896, I appointed Mr. W. H. Wittey, recommended by Dr. C. E. Cotton, veterinary inspector of the Minneapolis Board of Health, to act at the New Brighton stock yards, under Dr. Cotton's supervision. The result has been no further complaint from that locality. Slaughter, it is expected, will begin there in February for interstate and foreign commerce, when the inspection will be by the United States inspector, and our service will be no longer needed. His report will be presented to the board. (See Appendix VII.) He has reported daily since his appointment. I allowed him two dollars a day.

WORK OF THE SECRETARY IN WATER ANALYSES.

Report of analyses of water for 1895 and 1896, made by the secretary in laboratory of the department of health, University of Minnesota.

Minneapolis city supply	621	
St. Paul city supply	319	
Twenty-one other city supplies	108	
	—	1,048
Private wells	93	
Lakes and springs for private use	14	
Spring at university	46	
Old filter in mechanic arts building at university	3	
New filter in mechanic arts building at university	148	
New filter at laboratory	20	
	—	324
Total		1,372

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I have erected in the mechanic arts building at the university a large filter after the Massachusetts model, which has been in constant and satisfactory use for some months. One hundred and forty-eight analyses have been made from this source. I am experimenting with a smaller filter for domestic use, and have made twenty examinations of that water. Detailed statement of these examinations is being prepared as an appendix to this report.

BACTERIOLOGICAL EXAMINATIONS FOR DIPHTHERIA AND TUBERCULOSIS.

I began these examinations in October, 1894, and continued them until the establishment of the bacteriological laboratory under Dr. Wesbrook. During that time I examined 709 specimens for diphtheria; found the Klebs-Loeffler in 244, mixed cultures in 28, no Klebs-Loeffler in 79, and cocci only in 160. These samples were from sixty-two localities and forty-one counties.

From October, 1894, to April, 1896, I made 208 examinations of tubercular sputa from forty-one localities and twenty-seven counties. Found the bacillus tuberculosis in sixty-two samples, none in 105, and the rest doubtful.

Since the establishment of the bacteriological laboratory all specimens have been sent there.

LIBRARY.

The new catalogue is nearly completed. There are 1,917 volumes and 882 pamphlets. I have taken care to make it as complete as possible. The binding has been well done, and there are few similar collections of books of equal value. A few sets need completion, and I advise that it be done immediately.

FINANCIAL STATEMENT.

I have to report the St. Paul custom house officer declines to remit the duty on apparatus purchased at Dr. Wesbrook's request for the bacteriological laboratory. I have supplemented the protest of the attorney general by one including the evidence of other state boards, that similar importations for them have been admitted duty free, and sent copies to our senators at Washington requesting their coöperation. The intention is to take the amount of this expenditure from the balance of the unused appropriation of the year 1895-96. Dr. Wesbrook has the bills for the same.

I append a statement of the funds of the board up to Jan. 1, 1897. (Appendix VIII.)

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Until the afternoon of Jan. 11, 1897, I did not know that my term as a member of the board had expired. The governor's secretary informed another member of the board that it had, and that I had not been reappointed. This, then, is my last report. I have been secretary of the board since its organization, 1872, and have helped and watched its development from the beginning to the present time. The 4th of next March the board will have completed its first quarter of a century, so that my service as secretary has been within two months of twenty-five years. The best of my life and effort have gone into this work. I have spared neither time, labor nor thought to make it what it ought to be. Such as it is, the record is made and closed. I resume to-morrow the active practice of my profession with the sincere wish that the public health service of Minnesota may maintain and advance the position which it has won among similar organizations in other states. I am still more anxious that it continue to serve the whole people of Minnesota in the future as in the past. I respectfully call the attention of the board to the efficient service of the clerks now in the office, whose work has increased in value with experience and training. Simple justice demands an increase in their compensation. The financial statement has been brought up to Jan. 1, 1897, and compared with the account in the state auditor's office. The apparatus (chemical) belonging to the board in the laboratory of the department of sanitary science is ready for transfer, but it would be a great help to my work there if it could be left for a month until I can replace it.

CHARLES N. HEWITT.

St. Paul, Jan. 11, 1897.

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APPENDIX I.

INTERSTATE NOTIFICATIONS OF INFECTIOUS DISEASE.

(62 Reports for 1895; 25 Reports for 1896.)

SMALLPOX.

State.	1895.		1896.	
	Cases.	Deaths.	Cases.	Deaths.
Ohio	115	11	1	
Alabama	1		18	
Connecticut	4		2	
New Hampshire	19			
Tennessee	1			
Oklahoma Territory	3			
Illinois	7		8	
Indiana	22	5	3	
Wisconsin	245	49	5	
Pennsylvania	262	33	8	
Iowa	1		1	
Massachusetts	1			
Missouri	267	27		
Michigan	113	26	2	
Maryland	35	5		
Maine	1			
Rhode Island	1			
Ontario	14	2		
Washington			2	
Kansas			2	
Quebec			2	
Twenty-one localities	1,112	158	49	

DIPHTHERIA.

Pennsylvania	891	344	471	180

SCARLATINA.

Pennsylvania			202	60

APPENDIX II.

REPORTS FROM PORT OF NEW YORK.

No. Reports.	Disease.	Persons.	Localities.	Counties.
41	Measles	321	81	43
2	Scarlatina	29	10	9
3	Smallpox	19	5	4
46		369	96	56

REPORTS FROM PORT OF QUEBEC, CANADA.

7	Measles	80	22	19

One telegram from Baltimore in re smallpox; number not given to seven local at seven count.
One telegram from Philadelphia in re smallpox; fifteen persons to four local at seven count.

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APPENDIX III.

GRAPHIC CHARTS,

SHOWING A COMPARATIVE STATEMENT OF THE MORTALITY IN MINNESOTA

FROM

DIPHTHERIA, ENTERIC (TYPHOID) FEVER, TUBERCULAR DISEASES, DIARRHŒAL DISEASES OF CHILDREN,

BY MONTHS FOR THE YEARS 1894 AND 1895, AND THE AVERAGE OF NINE YEARS, 1887 TO 1895, INCLUSIVE.

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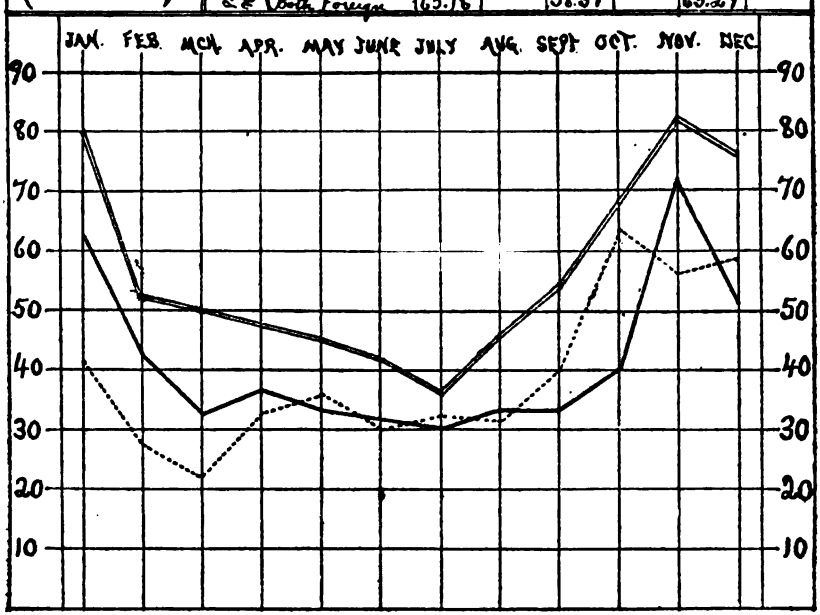
DIPHTHERIA

COMPARATIVE STATEMENT OF MORTALITY BY MONTHS FOR 1894-1895 AND AVERAGE OF 9 YEARS (1887-1895)

	1894		1895		ave. 9 yrs.	
	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.
State	3.32	31.4	3.02	29.6	4.72	43.9
Total cities over 60,000 population	2.02	25.5	3.39	45.0	4.00	54.6
Total cities between 15,000 & 60,000 pop.	2.87	32.6	1.28	13.4	3.04	28.7
Total cities between 5000 & 15,000 pop.	4.93	45.5	2.99	29.9	5.12	49.8
State, outside centres over 5000 pop.	3.85	32.2	3.01	26.0	5.21	41.4
	% this cause		% this cause		% this cause	
Sex: Males	52.23		48.25		49.71	
Sex: Females	47.47		51.75		50.29	
Ages: Under 1 yr	3.24	1.02	3.43	1.02	3.90	2.07
Ages: 1 yr to 2 yrs	6.88	2.16	8.58	2.55	7.66	4.07
Ages: 2 - 3 "	10.73	3.37	12.43	3.68	10.12	5.38
Ages: 3 - 4 "	12.55	3.93	10.51	3.11	11.13	5.91
Ages: 4 - 5 "	9.92	3.11	8.37	2.47	10.12	5.38
Ages: 5 - 10 "	30.43	11.43	31.97	9.49	35.26	18.66
Ages: 10 - 15 "	13.76	4.32	13.95	4.13	13.29	7.67
Ages: 15 - 20 "	3.44	1.08	4.72	1.47	4.33	2.30
Ages: Over 20 "	2.22	.69	5.89	1.72	3.01	1.61
Nativity: Both American	19.03		22.10		30.26	
Nativity: Both Foreign	65.18		58.37		63.29	



1894 —— 1895 ..... Average 9 yrs ═══

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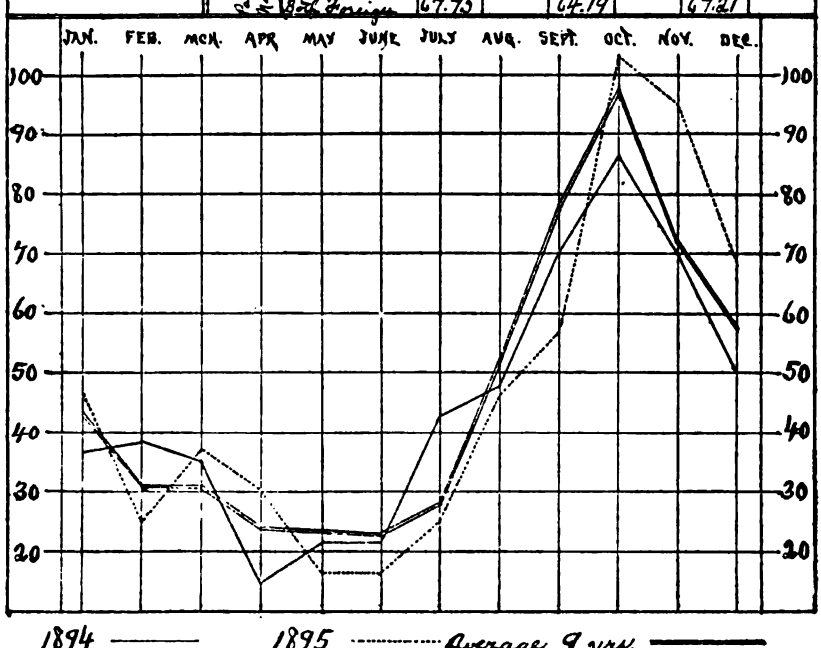
MINNESOTA STATE BOARD OF HEALTH & VITAL STATISTICS

ENTERIC (TYPHOID) FEVER

COMPARATIVE STATEMENT OF MORTALITY BY MONTHS FOR 1894 - 1895 AND AVERAGE OF 9 YEARS (1887 - 1895)

	1894		1895		Aver. 9 yrs.	
	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.
State	3.59	34.0	3.08	34.0	3.77	42.5
Total cities over 60,000 population	3.28	41.4	2.88	38.1	4.18	63.8
Total cities between 15,000 & 60,000 pop.	8.18	92.4	12.02	128.6	8.72	128.4
Total cities between 5,000 & 15,000 pop.	7.55	69.7	5.84	58.3	3.80	50.4
State outside centres over 5,000 pop.	3.01	25.1	3.03	26.2	3.12	38.1
	% this cause		% this cause		% this cause	
Sex: Males	58.69		60.49		60.22	
Sex: Females	41.31		39.58		39.78	
Age: Under 5 yrs	5.42	1.84	6.17	2.22	5.06	2.15
Age: 5 & 10 "	6.25	2.16	6.17	2.22	5.79	2.46
Age: 10 - 15 "	4.30	1.46	9.17	3.30	6.70	2.84
Age: 15 - 20 "	12.71	4.34	11.64	4.19	14.13	5.99
Age: 20 - 30 "	32.50	11.68	32.63	11.75	36.59	15.52
Age: 30 - 40 "	21.12	7.24	20.46	7.37	16.49	6.99
Age: 40 - 50 "	9.15	3.11	8.11	2.92	7.06	2.99
Age: 50 - 60 "	3.86	1.14	2.47	.89	3.80	1.61
Age: over 60 "	1.87	.64	2.64	.95	2.71	1.15
Nativity: Native American	15.04		18.16		15.76	
Nativity: Foreign	67.75		64.19		67.21	



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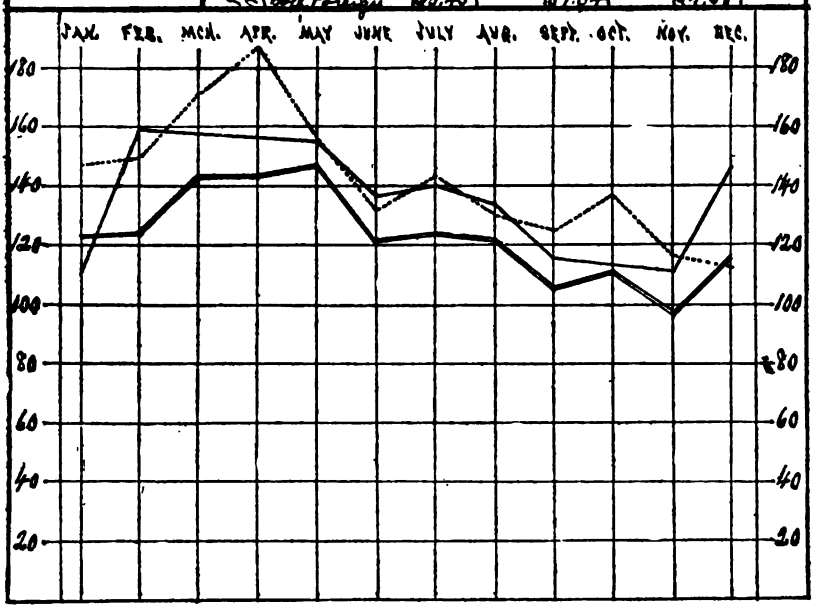
TUBERCULAR DISEASES

COMPARATIVE STATEMENT OF MORTALITY BY MONTHS FOR 1894 - 1895 AND AVERAGE OF 9 YEARS (1887 - 1895)

	1894		1895			
	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.	% to all causes	Deaths to 100,000 pop.
State	11.06	104.4	10.98	107.5	10.09	113.7
Total cities over 6000 population	13.13	165.6	14.00	159.0	10.73	163.9
Total cities between 15000 & 60000 pop.	10.72	121.2	10.46	111.2	9.13	132.9
Total cities between 5000 & 15000 pop.	13.41	123.7	12.54	125.1	11.55	153.3
State outside centres over 5000 pop.	9.98	83.3	10.44	90.4	9.70	93.5
	% this cause		% this cause		% this cause	
Sex { Males	46.72		44.36		46.28	
Sex { Females	53.28		55.64		53.72	
Age { Under 1 yr.	4.56	4.76	4.47	5.02	5.00	5.68
Age { 1 to 5 yrs.	6.03	6.29	5.26	5.78	5.34	6.07
Age { 5 - 10 "	2.32	2.41	2.36	2.64	2.16	2.46
Age { 10 - 20 "	11.44	11.93	12.41	13.22	11.63	13.21
Age { 20 - 30 "	31.02	32.39	29.98	32.13	30.48	34.64
Age { 30 - 40 "	21.90	22.86	21.74	23.27	20.41	23.27
Age { 40 - 50 "	9.67	10.09	9.92	10.66	10.48	11.91
Age { 50 - 60 "	6.93	7.24	7.74	8.33	7.30	8.22
Age { 60 - 70 "	5.72	5.96	5.85	6.29	5.95	6.78
Birth { Born American	17.27		18.02		17.73	
Birth { Born Foreign	65.45		67.04		64.56	



1894 ——— 1895 ····· Average 9 yrs. ═══

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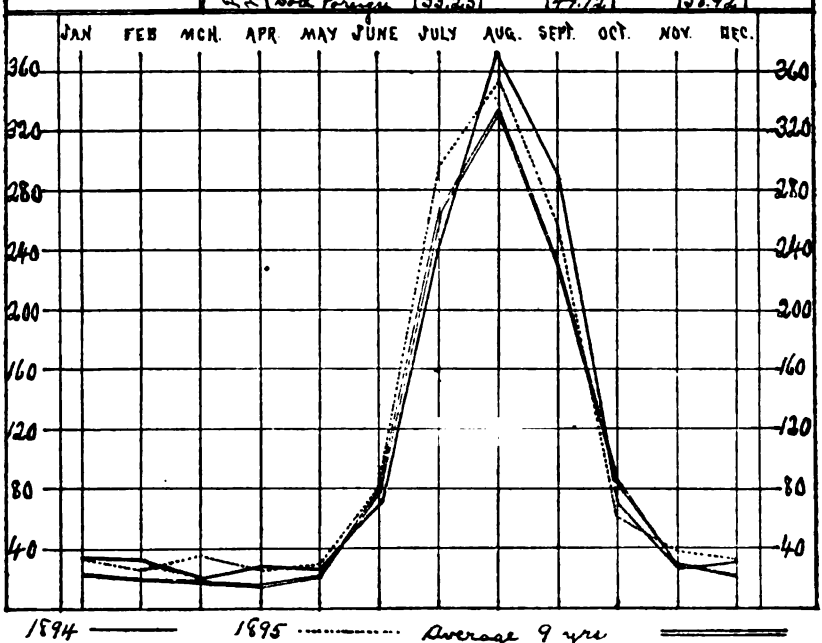
DIARRHOEAL DISEASES OF CHILDREN

COMPARATIVE STATEMENT OF MORTALITY BY MONTHS FOR 1894 - 1895 AND AVERAGE OF 9 YEARS (1887 - 1895)

	1894		1895		Aver. 9 yrs.	
	% to all causes	Deaths to 10,000 pop.	% to all causes	Deaths to 10,000 pop.	% to all causes	Deaths to 10,000 pop.
State	8.26	79.2	8.05	78.8	7.74	87.2
Total cities over 60,000 population	9.11	114.9	8.61	114.0	10.08	153.9
Total cities between 15,000 & 60,000 pop.	13.26	149.9	10.59	112.4	13.18	192.1
Total cities between 5,000 & 15,000 pop.	8.98	82.5	10.25	102.4	7.02	93.1
State outside centres over 5,000 pop.	7.53	62.9	7.40	64.1	6.14	59.2
	% this cause		% this cause		% this cause	
Sex: Males	55.17		54.55		54.35	
Sex: Females	44.83		45.45		45.57	
Age: Under 1 year	7.69	6.03	9.83	7.70		
Age: 1 to 2 "	7.64	5.98	7.65	6.02		
Age: 2 " 3 "	7.46	5.91	7.01	5.52		
Age: 3 " 4 "	9.87	7.81	8.06	6.35		
Age: 11 " 12 "	3.53	2.79	3.22	2.54		
Under 1 yr.	77.54	61.4	76.47	60.5	77.29	67.6
1 to 2 yrs	16.12	13.4	15.29	12.1	16.01	12.9
2 " 3 "	3.28	2.40	4.67	3.67	3.52	3.07
3 " 5 "	2.96	2.35	3.14	2.48	2.29	1.99
Parent Nativity: Both Americans	2.574		26.91		23.75	
Both Foreign	55.25		49.72		58.92	



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APPENDIX IV.

REPORT ON TUBERCULIN FOR 1895 AND 1896.

Locality.	County.	Amount Sent.	Reports Received.	Animals Condemned.	Animals Released.	Does Not Account for.
Austin (city)	Mower	2	2	.....	2	.....
Bird Island (village)	Renville	6	6	.....	6	.....
Faribault (city)	Rice	6	7	.....	7	.....
Garfield township	Polk	6	5	.....	5	1
Hampden township	Kittson	57	59	16	43	.....
Kingman township	Renville	21	19	11	8	2
Le Sueur (city)	Le Sueur	6	1	.....	1	5
Minneapolis (city)	Hennepin	226	226	41	185	.....
Bingham Lake (village)	Cottonwood	36	.....	.....	.....	36
Mankato (city)	Blue Earth	26	14	1	13	12
Northfield township	Rice	6	.....	.....	.....	6
New Ulm (city)	Brown	12	.....	.....	.....	12
Nelson	Watonwan	2	.....	.....	.....	2
Rochester (city)	Olmsted	18	4	.....	4	14
Red Wing (city)	Goodhue	34	33	.....	33	1
Renville (village)	Renville	15	15	.....	15	.....
St. Peter (city)	Nicollet	42	42	.....	42	.....
Starbuck (village)	Pepe	6	6	.....	6	.....
Shakopee (city)	Scott	1	.....	.....	.....	1
St. Paul (city)	Ramsey	2,566	2,473	113	2,360	93
St. James (city)	Watonwan	12	11	.....	11	1
South St. Paul (city)	Dakota	60	52	.....	52	8
Spring Valley (village)	Fillmore	6	.....	.....	.....	6
Thompson township	Kittson	7	.....	.....	.....	7
White Bear Lake (village)	Ramsey	2	.....	.....	.....	2
Waseca (city)	Waseca	2	.....	.....	.....	2
Welcome (village)	Martin	2	.....	.....	.....	2
Totals		3,185	2,975	182	2,793	218

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APPENDIX V.

TABLE SHOWING DISTRIBUTION AND DISPOSAL OF ANIMALS SUSPECTED OF AND ISOLATED FOR GLANDERS, 1895 AND 1896.

Locality.	1895.					1896.				
	Cases.	Killed.	Died.	Released.	Remaining.	Cases.	Killed.	Died.	Released.	Remaining.
Aitkin County—										
Aitkin (village)	6			6						
Becker County—										
Carsonville township	1				1					
Lake Park (village)						6			6	
Erie township						1	1			
Audubon township						22	1		21	
Detroit (village)						1				1
Benton County—										
Langola township						8			8	
Big Stone County—										
Graceville (village)	2	1		1						
Blue Earth County—										
Lincoln township	9	9								
Brown County—										
New Ulm (city)	1	1								
Carver County—										
Chaska (city)						2	2			
Cass County—										
Unorganized township						5	5			
Chippewa County—										
Granite Falls (village)	1				1					
Sparta Township						5	2	2		1
Chisago County—										
Nessel township						1				1
Clay County—										
Felton township	2	1		1						
Hagen township	5	2			3					
Cottonwood County—										
Great Bend township	1	1								
Crow Wing County—										
Daggett Brook township	1				1					
Oak Lawn township						1	1			
Dakota County—										
Hastings (city)						1		1		
Douglas County—										
Alexandria						1				1
Fillmore County—										
Chatfield (city)	1				1					
Spring Valley (village)						1	1			
Goodhue County—										
Red Wing (city)	1	1								
Grant County—										
North Ottawa township	5	2		3						
Hereford township	2				2					
St. Olaf township						12	3		9	
Hennepin County—										
Plymouth township	2	1			1					
Minneapolis (city)	99	99				110	110			
Brooklyn township						1	1			
Crystal Lake township						2	1		1	
Hubbard County—										
Park Rapids (village)	1				1					
Kandiyohi County—										
Holland township	1				1					
Roseville township						1				1
Kittson County—										
Davis township						1	1			
Hallock township	4	4								
Jackson County—										
Alba township						5	3		2	
Lincoln County—										
Drammen township	2			2						
Lake Stay township	2				2					

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APPENDIX V.—*Continued.*

Locality.	1895.					1896.				
	Cases.	Killed.	Died.	Released.	Remaining.	Cases.	Killed.	Died.	Released.	Remaining.
Lyon County—										
Custer township	1				1					
Lake Sarah township	1	1								
McLeod County—										
Helen township	6	1		5						
Hutchinson township	1				1					
Marshall County—										
Middle River township	1	1								
Oak Park township						11	5		6	
Alma township	6	1		5						
Morrison County—										
Bellevue township						3			3	
Murray County—										
Slayton (village)	1		1							
Fenton township	1				1					
Nobles County—										
Worthington (village)	2				2					
Hersey township	3	3		5						
Norman County—										
Hague township	2			2						
Mary township						1			1	
Otter Tail County—										
St. Olaf township	5	3		1	1					
Sverdrup township						4	2		2	
Perham township						1	1			
Pipestone County—										
Burke township	1			1						
Polk County—										
East Grand Forks (village)	3				3					
Sandsville township						10			10	
Crookston township						2				2
Lake Pleasant township						3				3
Pope County—										
Glenwood township	1			1						
Ramsey County—										
St. Paul (city)	5	5				11	11			
Redwood County—										
Kintire township	6	6								
Johnsonville township	3	3				7	1			6
Willow Lake township						4	3			1
Waterbury township										
Renville County—										
Emmett township	2				2					
Renville (village)	1				1	1			1	
Mellville township						6				6
Rice County—										
Walcott township	3	1		2						
Faribault (city)	2	1		1						
Warsaw township	3				3					
Dundas (village)						1			1	
Rock County—										
Denver township	1			1						
Stearns County—										
St. Martin township	1	1								
Albany (village)	1	1				3	3			
Spring Hill township						5	1		4	
Steele County—										
Havana township	1				1					
Todd County—										
Mykeham township						1				1
Wabasha County—										
Chester township	2	2								
Lake City (city)	1				1					
Wadena County—										
Shell River township						2				2
Washington County—										
Oneka township	1			1						
Watonwan County—										
Madelia township	1				1					

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APPENDIX V.—*Continued.*

Locality.	1895.					1896.				
	Cases.	Killed.	Died.	Released.	Remaining.	Cases.	Killed.	Died.	Released.	Remaining.
Wilkin County—										
Breckenridge (village)	1			1						
Wright County—										
Victor township	4		1	3		2	2			
Albion township	2				2					
Middleville township	3	2		1						
Waverly (village)	1	1								
Howard Lake (village)	2				2					
Buffalo township	1				1					
Clearwater (village)						1				1
Yellow Medicine County—										
Hazel Run township	1	1								
Clarkfield (village)	1			1						

GENERAL STATISTICS OF GLANDERS, 1895-96.

Summary.	1895.	1896.
Counties invaded	40	29
Localities invaded	61	41
Number of horses isolated	243	264
Number of horses killed	156	161
Number of horses died	2	3
Number of horses released	44	70
Number of horses disposition not reported	41	30

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APPENDIX VI.

REPORT ON MALLEIN FOR 1895 AND 1896.

Locality.	County.	Doses Sent.	Reports Received.	Animals Condemned.	Animals Released.	Doses not Accounted for.
Alma township	Marshall	6	5	.....	5	1
Aitkin (village)	Aitkin	6	.....	.....	.....	6
Albion township	Wright	2	2	.....	2	.....
Alba township	Jackson	6	5	3	2	1
Audubon township	Becker	22	22	1	21	.....
Alexandria township	Douglas	3	.....	.....	.....	3
Albany (village)	Stearns	2	2	1	1	.....
Burke township	Pipestone	2	.....	.....	.....	2
Buffalo township	Wright	2	.....	.....	.....	2
Chatfield (city)	Fillmore	2	1	.....	1	1
Clarkfield (city)	Yellow Medicine	1	.....	.....	.....	1
Chester township	Wabasha	2	2	.....	2	.....
Crookston township	Polk	3	.....	.....	.....	3
Detroit (village)	Becker	2	.....	.....	.....	2
Dundas (village)	Rice	2	.....	.....	.....	2
East Grand Forks (village)	Polk	4	.....	.....	.....	4
Glenwood township	Pope	2	1	.....	1	1
Granite Falls (village)	Yellow Medicine	2	.....	.....	.....	2
Graceville (village)	Big Stone	2	2	1	1	.....
Howard Lake (village)	Wright	2	.....	.....	.....	2
Hendrum township	Norman	2	2	.....	2	.....
Hutchinson township	McLeod	4	.....	.....	.....	4
Havana township	Steele	3	.....	.....	.....	3
Holland township	Kandiyohi	2	.....	.....	.....	2
Hersey township	Nobles	9	8	2	6	1
Helen township	McLeod	6	5	1	4	1
Johnsonville township	Redwood	2	2	.....	2	.....
Kingman township	Renville	6	.....	.....	.....	6
Lake Stay township	Lincoln	2	.....	.....	.....	2
Lincoln township	Blue Earth	31	18	5	13	13
Cass county	Cass	8	8	5	3	.....
Lake Park township	Becker	6	6	.....	6	.....
Lake Pleasant township	Polk	6	.....	.....	.....	6
Minneapolis (city)	Hennepin	62	47	22	25	15
Madelia (village)	Watonwan	6	.....	.....	.....	6
Middleville township	Wright	6	3	2	1	3
Mary township	Norman	2	1	.....	1	1
Mellville township	Renville	6	.....	.....	.....	6
Minneota township	Jackson	2	.....	.....	.....	2
North Ottawa township	Grant	6	5	2	1	1
New Ulm (city)	Brown	6	1	1	.....	5
Oak Park township	Marshall	16	8	4	4	8
Plymouth township	Hennepin	2	.....	.....	.....	2
Park Rapids (village)	Hubbard	3	.....	.....	.....	3
Renville (village)	Renville	2	2	1	1	.....
Red Wing (city)	Goodhue	1	.....	.....	.....	1
St. Paul (city)	Ramsey	29	15	5	10	14
Sleepy Eye (village)	Brown	6	.....	.....	.....	6
Stony Brook township	Grant	6	.....	.....	.....	6
Slayton (village)	Murray	2	.....	.....	.....	2
St. Olaf township	Otter Tail	17	16	6	10	1
Sverdrup township	Otter Tail	8	2	.....	2	6
South St. Paul (city)	Dakota	6	.....	.....	.....	6
Sandsville township	Polk	22	22	.....	12	.....
Viding township	Clay	3	3	3	.....	.....
Victor township	Wright	12	5	1	4	7
Wolcott township	Rice	9	9	4	5	.....
Warsaw township	Rice	3	3	1	.....	.....
Willow Lake township	Redwood	6	6	.....	6	.....
Totals		411	289	71	156	174

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APPENDIX VII.

REPORT FROM NEW BRIGHTON STOCK YARDS, OCT. 30, 1896.

1896.	CATTLE.							HOGS.						SHEEP.						
	No. Cattle Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.	No. Hogs Received.	Slaughtered.	Sold.	Going Through.	Destination.	Condition.	No. Sheep Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.
Oct. 30	183	.....	.....	.....	.....	.....	Good	.....	.....	.....	.....	.....	.....	180	.....	.....	.....	.....	.....	Good
Oct. 31	345	.....	.....	.....	.....	.....	Good	.....	.....	.....	.....	.....	.....	4,270	.....	.....	.....	.....	.....	Good
Nov. 2	882	.....	.....	.....	.....	.....	Good	.....	.....	.....	.....	.....	.....	8,987	.....	.....	.....	.....	.....	Good
Nov. 3	.....	.....	.....	.....	.....	.....	Good	.....	.....	.....	.....	.....	.....	677	.....	.....	.....	.....	.....	Good
Nov. 4	75	.....	.....	.....	.....	.....	Good	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nov. 5	.....	.....	.....	.....	.....	.....	.....	24	.....	.....	.....	.....	.....	2,250	.....	.....	.....	.....	.....	Good
Nov. 6	137	51	51	.....	.....	.....	Good	178	.....	178	178	.....	.....	60	60	1,057	.....	1,047	Chicago	Good
Nov. 7	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	368	80	60	.....	.....	.....	Good
Nov. 8	120	.....	.....	.....	120	Chicago	Good	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	460	Chicago	Good
Nov. 9	572	44	44	.....	575	Chicago	Good	77	77	90	.....	.....	.....	4,080	95	95	*2	1,980	Chicago	Good
Nov. 10	57	.....	.....	.....	64	Anoka	Good	15	22	22	.....	.....	.....	3,375	.....	.....	.....	3,375	Chicago	Good
Nov. 11	68	68	68	.....	64	Chicago	Good	7	.....	.....	.....	.....	.....	1,540	60	.....	.....	.....	Chicago	Good
Nov. 12	.....	.....	.....	.....	.....	.....	.....	105	105	105	.....	.....	.....	8,876	.....	.....	.....	5,600	Chicago	.....
Nov. 13	4	4	.....	.....	.....	Chicago	Good	250	.....	97	.....	.....	.....	198	75	.....	†2	.....	.....	.....
Nov. 14	28	.....	.....	.....	.....	Chicago	Good	140	.....	61	61	Milw'ke	Good	1,985	.....	.....	.....	.....	.....	.....
Nov. 16	253	64	95	.....	120	Chicago	Good	.....	.....	.....	.....	Chicago	.....	12,225	.....	1,075	.....	2,680	Chicago	.....
Nov. 17	.....	.....	.....	.....	28	Chicago	Good	8	42	8	.....	Chicago	.....	5,775	.....	.....	.....	.....	Chicago	.....
Nov. 18	261	29	145	.....	65	Chicago	Good	75	.....	.....	.....	.....	.....	.....	.....	469	.....	620	Chicago	.....
Nov. 19	65	47	.....	.....	.....	.....	.....	10	88	.....	72	Milw'ke	.....	5,890	.....	.....	.....	1,080	Anoka	.....
Nov. 20	140	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,170	.....	.....	.....	.....	.....	.....
Total	2,546	307	403	.....	1,036	.....	.....	888	349	356	306	.....	.....	62,006	370	2,756	4	20,842	.....	.....

* Bloated. † Crippled.

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NEW BRIGHTON STOCK YARDS, NOV. 21, 1896.

1896.	CATTLE.							HOGS.							SHEEP.						
	No. Cattle Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.	No. Hogs Received.	Slaughtered.	Sold.	Going Through.	Isolated for What.	Destination.	Condition.	No. Sheep Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.
Nov. 21	53	21	112	.....	.....	.....	.....	73	73	73	.....	.....	.....	.....	2,680	.....	1,081	.....	.....	.....	.....
Nov. 23	71	.....	71	.....	.....	.....	.....	6	.....	6	.....	.....	.....	.....	.....	95	1,062	.....	1,620	Chicago	Good
Nov. 24	22	.....	70	.....	22	Chicago	Fair	67	73	67	.....	.....	.....	.....	2,620	.....	.....	.....	9,330	Chicago	Good
Nov. 25	.....	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Chicago	Good
Nov. 27	60	.....	.....	.....	40	Chicago	Good	81	81	81	.....	.....	.....	.....	1,868	60	.....	.....	2,025	Chicago	Good
Nov. 28	.....	40	.....	.....	.....	Chicago	Good	.....	.....	.....	.....	.....	.....	.....	.....	30	398	.....	.....	Chicago	Good
Nov. 30	.....	.....	.....	.....	.....	Chicago	Good	.....	.....	.....	.....	.....	.....	.....	.....	34	.....	.....	2,560	Chicago	Good
Dec. 1	108	.....	.....	.....	.....	Chicago	Good	10	.....	10	.....	.....	.....	.....	150	.....	404	.....	404	Chicago	Good
Dec. 2	.....	.....	.....	.....	.....	Chicago	Good	71	10	.....	.....	.....	.....	.....	1,124	.....	.....	.....	.....	Chicago	Good
Dec. 3	248	45	137	.....	219	Chicago	Good	88	71	88	.....	.....	.....	.....	3,550	.....	.....	*3	.....	Chicago	Good
Dec. 4	.....	43	18	.....	.....	.....	.....	75	86	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	Chicago	Good
Dec. 5	.....	23	7	.....	.....	.....	.....	162	85	143	.....	.....	.....	.....	.....	.....	.....	.....	.....	Chicago	Good
Dec. 7	48	.....	22	.....	.....	.....	.....	.....	143	.....	.....	.....	.....	.....	3,760	20	.....	.....	3,000	Chicago	Good
Dec. 8	3	.....	26	.....	.....	.....	.....	20	.....	14	.....	.....	.....	.....	.....	50	199	†2	.....	.....	.....
Total	613	216	463	.....	281	.....	.....	648	522	552	.....	.....	.....	.....	15,744	289	3,144	5	19,139	.....	.....

* Overfeed. † Bloated.

NEW BRIGHTON STOCK YARDS, DEC. 9, 1896.

1896.	CATTLE.							HOGS.						SHEEP.						
	No. Cattle Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.	No. Hogs Received.	Slaughtered.	Sold.	Isolated for What.	Destination.	Condition.	No. Sheep Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.
December 9	.....	.....	.....	.....	.....	.....	.....	9	.....	.....	.....	.....	.....	220	.....	.....	†3	.....	.....	.....
December 10	.....	.....	.....	.....	.....	.....	.....	13	.....	13	.....	.....	.....	2,015	100	.....	.....	.....	.....	.....
December 11	1	35	1	*1	.....	.....	.....	.....	.....	.....	.....	.....	.....	450	40	.....	.....	.....	.....	.....
December 12	55	20	1	.....	65	Chicago	Good	.....	.....	.....	.....	.....	.....	.....	40	.....	.....	3,895	Chicago	Good
December 14	295	40	121	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,790	40	.....	.....	.....	.....	.....
December 15	.....	30	22	.....	.....	.....	.....	71	.....	62	.....	.....	.....	4,620	75	1,742	‡4	.....	.....	.....
December 16	.....	52	.....	.....	.....	.....	.....	82	.....	91	.....	.....	.....	815	.....	.....	.....	.....	.....	.....
December 17	100	.....	.....	.....	100	Iowa	Fair	8	41	.....	.....	.....	.....	.....	85	.....	.....	.....	.....	.....
December 18	.....	.....	.....	.....	.....	.....	.....	8	152	8	.....	.....	.....	.....	75	.....	.....	.....	.....	.....
December 19	25	21	25	.....	.....	.....	.....	13	.....	21	.....	.....	.....	620	.....	.....	.....	.....	.....	.....

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NEW BRIGHTON STOCK YARDS, DEC. 24, 1896.

1896.	CATTLE.							HOGS.							SHEEP.						
	No. Cattle Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.	No. Hogs Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.	No. Sheep Received.	Slaughtered.	Sold.	Isolated for What.	Going Through.	Destination.	Condition.
December 24	29	29	29		40	On feed		8	20								306	*1			
December 26	28		28		32	On feed		16		16											
December 28	72		5		25	Chicago	Fair								430			*2	2,400	Chicago	Good
December 29	38	37	72		35	On feed											410				
December 30	4		18							31					395			†2			
December 31		34			Off feed												40		1,195	Chicago	Good
January 2	22	35	22		50	Chicago	Good										90	†3			
January 4			50					8											2,600	Chicago	Good
January 5	21	25	21						40								70	*3			
January 6	4	21						95	95	95							30		3,450	Chicago	Good
January 7	45	29	25					25		31							109	‡1			
Total	333	210	270		182			152	155	173					815	330	926	12	11,645		

*Crippled. †Bloated. ‡Water bloated.

W. H. WITTEY, *Inspector*

RECAPITULATION.

Total cattle received	4,027	Total hogs received	1,909	Total sheep received	92,980
Total cattle slaughtered	1,076	Total hogs slaughtered	1,451	Total sheep slaughtered	1,578
Total cattle shipped	2,664	Total hogs shipped	306	Total sheep shipped	47,781
Cattle on feed	850	Balance of hogs on hand	.....	Total sheep on feed	.....

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APPENDIX VIII.

"STATE BOARD OF HEALTH" FUND—FINANCIAL STATEMENT.

January 1, 1895, to January 1, 1897.

Appropriation Aug. 1, 1894, to Aug. 1, 1895		$8,500.00
Expenses Aug. 1, 1894, to Jan. 1, 1895	$3,262.56	
	$3,262.56	$8,500.00
Balance, Jan. 1, 1895	5,237.44	
	$8,500.00	$8,500.00
Balance, Jan. 1, 1895		5,237.44
Account of Feb. 13, 1895, for January, 1895	410.43	
Account of March 21, 1895, for February, 1895	333.07	
Account of April 15, 1895, for March, 1895	380.81	
Account of May 18, 1895, for April, 1895	286.54	
Account of June 11, 1895, for May, 1895	409.47	
Account of July 19, 1895, for June, 1895	402.61	
Account of Aug. 13, 1895, for July, 1895	401.18	
Secretary's salary, seven months	2,041.62	
	$4,620.73	
Account of Jan. 11, 1896, paid out of appropriation for 1894-1895	297.03	
	$4,917.76	$5,237.44
Balance turned over to treasurer	319.68	
	$5,237.44	$5,237.44
Appropriation Aug. 1, 1895, to Aug. 1, 1896		8,500.00
Account of Sept. 12, 1895, for August, 1995	246.49	
Account of Oct. 19, 1895, for September, 1895	325.43	
Account of Nov. 16, 1895, for October, 1895	360.40	
Account of Dec. 3, 1895, for November, 1895	178.00	
Account of Dec. 17, 1895, for November, 1895	82.22	
Account of Jan. 11, 1896, for December, 1895	207.95	
Account of Feb. 10, 1896, for January, 1896	261.56	
Account of March 6, 1896, for February, 1896	392.80	
Account of April 14, 1896, for March, 1896	480.46	
Account of May 7, 1896, for April, 1896	589.67	
Account of June 6, 1896, for May, 1896	324.54	
Account of July 8, 1896, for June, 1896	301.27	
Secretary's salary, twelve months	3,500.00	
	$7,245.79	
Balance, Aug. 1, 1896	1,254.21	
	$8,500.00	$8,500.00
Appropriation Aug. 1, 1896, to Aug. 1, 1897		$8,500.00
Account of Aug. 6, 1896, for July, 1895	$603.80	
Account of Sept. 9, 1896, for August, 1895	448.98	
Account of Oct. 10, 1896, for September, 1895	536.13	
Account of Nov. 6, 1896, for October, 1895	472.87	
Account of Dec. 5, 1896, for November, 1895	477.98	
Account of Jan. 8, 1897, for December, 1895	703.44	
Secretary's salary, five months	1,458.30	
	$4,701.50	
Balance, Jan. 1, 1897	3,798.50	
	$8,500.00	$8,500.00

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ITEMIZED STATEMENT "STATE BOARD OF HEALTH" FUND—FINANCIAL STATEMENT.

	Jan. 1, 1895 to Aug. 1, 1895.	Aug. 1, 1895 to Aug. 1, 1896.	Aug. 1, 1896 to Jan. 1, 1896.
Rent of office	$420.00	$660.00	$360.00
Stationery and office supplies	91.41	69.90	46.87
Express and freight	24.91	62.28	21.11
Telegraph and telephone	86.21	82.45	45.23
Clerks	461.00	705.00	385.00
Postage	134.50	139.30	52.00
Printing blanks, circulars, etc	144.18	57.55	.....
Printing Fourteenth Biennial Report	126.87	.....	.....
Printing blanks for returns of vital statistics	125.40	.....	.....
Books and binding for library	39.47	78.23	97.97
Laboratory, supplies, apparatus, assistants, etc	863.00	700.21	291.31
Expenses of members attending board meetings	50.45	84.76	72.17
Expenses of secretary investigating disease outbreaks	12.26	15.92	.....
Salary of secretary	2,041.62	3,500.00	1,458.30
Salary of president	175.00	125.00	300.00
Smallpox at Brainerd—expenses incurred	122.08	.....	.....
Expenses, delegates to Am. P. H. Ass'n conference	.....	139.10	138.32
Bacteriological laboratory—established in 1896—expenses and apparatus	.....	272.81	333.32
Salary of bacteriologist from Jan. 14, 1896	.....	553.28	600.00
Total	$4,917.76	$7,245.51	$4,701.50

"INFECTIOUS DISEASES OF ANIMALS" FUND—FINANCIAL STATEMENT.

January 1, 1895, to January 1, 1897.

Appropriation, Aug. 1, 1894, to Aug. 1, 1895		$3,000.00
Expenses from Aug. 1, 1894, to Jan. 1, 1895	$663.54	
	663.54	
Balance, Jan. 1, 1895	2,336.46	
	$3,000.00	$3,000.00
Balance, Jan. 1, 1895		2,336.46
Account of Feb. 13, 1895, for January, 1895	216.26	
Account of March 21, 1895, for February, 1895	284.76	
Account of April 15, 1895, for March, 1895	114.67	
Account of May 18, 1895, for April, 1895	144.87	
Account of June 11, 1895, for May, 1895	285.31	
Account of July 19, 1895, for June, 1895	148.43	
Account of Aug. 13, 1895, for July, 1895	160.91	
	$1,300.21	
Balance, turned over to treasurer, Aug. 1, 1895	1,036.25	
	$2,336.46	$2,336.46
Appropriation Aug. 1, 1895, to Aug. 1, 1896		3,004.00
Account of Sept. 12, 1895, for August, 1895	97.06	
Account of Oct. 19, 1895, for September, 1895	108.79	
Account of Nov. 16, 1895, for October, 1895	126.56	
Account of Dec. 3, 1895, for November, 1895	70.00	
Account of Dec. 17, 1895, for November, 1895	93.06	
Account of Jan. 11, 1896, for December, 1895	143.41	
Account of Feb. 10, 1896, for January, 1896	170.40	
Account of March 6, 1896, for February, 1896	101.40	
Account of April 14, 1896, for March, 1896	115.10	
Account of May 7, 1896, for April, 1896	88.47	
Account of June 6, 1896, for May 1896	76.87	
Account of July 8, 1896, for June, 1896	88.50	
	$1,274.62	
Balance, turned over to treasurer, Aug. 1, 1895	1,725.38	
	$3,000.00	$3,000.00

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Appropriation, Aug. 1, 1896, to Aug. 1, 1897		$3,000.00
Account of Aug. 6, 1896, for July, 1896	$109.38	
Account of Sept. 9, 1896, for August, 1896	79.10	
Account of Oct. 6, 1896, for September, 1896	55.00	
Account of Nov. 6, 1896, for October, 1896	66.60	
Account of Dec. 5, 1896, for November, 1896	165.61	
Account of Jan. 8, 1897, for December, 1896	109.80	
	$585.49	
Balance, Jan. 1, 1897	2,414.51	
	$3,000.00	$3,000.00

ITEMIZED STATEMENT "INFECTIOUS DISEASE OF ANIMALS" FUND.

	Jan. 1, 1895 to Aug. 1, 1895.	Aug. 1, 1895 to Aug. 1, 1896.	Aug. 1, 1896 to Jan. 1, 1897.
Rent of office	$210.00	$330.00	$150.00
Stationery and office supplies	59.77	82.45	48.15
Express and freight	3.85	1.70	.....
Clerks	175.00	275.00	150.00
Postage	45.00	44.0.	.....
Printing—blanks, circulars, etc	52.12	58.32	10.50
Printing Fourteenth Biennial Report	169.81	.....	.....
Books and binding for library	10.61	6.05	18.65
Professional services and expenses—physicians, veterinarians and members of board investigating disease outbreaks	281.94	284.39	26.78
Appraisals—animals killed for infectious disease	12.00	.....	21.60
Laboratory—supplies, apparatus, assistants, etc	280.11	181.16	.....
Telegraph and telephone	.....	21.55	20.20
Care of horses quarantined for glanders	.....	40.00	.....
Salary of live stock inspector at New Brighton	.....	.....	109.61
	$1,300.21	$1,274.62	$585.49

"VITAL STATISTICS" FUND—FINANCIAL STATEMENT.

January 1, 1895, to January 1, 1897.

Appropriation, Aug. 1, 1894, to Aug. 1, 1895		$1,000.00
Expenses from Aug. 1, 1894, to Jan. 1, 1895	$391.13	
Balance, Jan. 1, 1895	608.87	
	$1,000.00	$1,000.00
Balance, Jan. 1, 1895		608.87
Account of Feb. 13, 1895, for January, 1895	120.15	
Account of March 21, 1895, for February, 1895	81.05	
Account of April 15, 1895, for March, 1895	186.10	
Account of May 18, 1895, for April, 1895	70.90	
Account of June 11, 1895, for May, 1895	70.00	
Account of July 19, 1895, for June, 1895	52.00	
Account of August 13, 1895, for July, 1895	51.00	
	$581.20	
Balance, turned over to treasurer Aug. 1, 1895	27.67	
	$608.87	$608.87
Appropriation, Aug. 1, 1895, to Aug. 1, 1896		1,000.00
Account of Sept. 12, 1895, for August, 1895	$62.50	
Account of Oct. 19, 1895, for September, 1895	50.00	
Account of Nov. 16, 1895, for October, 1895	57.00	
Account for Dec. 3, 1895, for November, 1895	30.00	
Account of Dec. 17, 1895, for November, 1895	20.05	
Account of Jan 11, 1896, for December, 1895	84.00	
Account of Feb. 10, 1896, for January, 1896	75.50	
Account of March 6, 1896, for February, 1896	87.00	
Account of April 14, 1896, for March, 1896	68.75	
Account of May 7, 1896, for April, 1896	65.00	
Account of June 6, 1896, for May, 1896	70.35	
Account of July 8, 1896, for June, 1896	78.00	
	$748.15	
Balance, turned over to treasurer Aug. 1, 1896	251.85	
	$1,000.00	$1,000.00

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Appropriation, Aug. 1, 1896, to Aug. 1, 1897		$1,000.00
Account of Aug. 6, 1896, for July 1896	$61.00	
Account of Sept. 9, 1896, for August, 1896	74.00	
Account of Oct. 10, 1896, for September, 1896	63.00	
Account of Nov. 6, 1896, for October, 1896	74.60	
Account of Dec. 5, 1896, for November, 1896	64.75	
Account of Jan. 8, 1897, for December, 1896	71.00	
	$408.35	
Balance, Jan. 1, 1897	591.65	
	$1,000.00	$1,000.00

ITEMIZED STATEMENT "VITAL STATISTICS" FUND.

	Jan. 1, 1895 to Aug. 1, 1895.	Aug. 1, 1895 to Aug. 1, 1896.	Aug. 1, 1896 to Jan. 1, 1897.
Stationery and office supplies	$4.00	$5.05	$0.75
Printing—blanks, circulars, etc.	2.25	34.50	2.60
Express and freight	28.95	5.35	.....
Clerks	411.00	545.00	325.00
Postage	135.00	158.25	80.00
	$581.20	$748.15	$408.35

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FIRST ANNUAL REPORT

OF THE

BACTERIOLOGICAL LABORATORY

OF THE

MINNESOTA STATE BOARD OF HEALTH.

As the board is aware, although the appointment of a bacteriologist was made at the last annual meeting, it was not until the April meeting that any steps were taken towards furnishing or equipping a laboratory. At the meeting in April, plans were submitted and approved for certain furnishings, which were, however, subsequently modified so as to prepare only a part of the large room placed at the board's disposal by the state university for use. It was impossible to obtain at this or any subsequent meeting an expression of opinion as regards the scope of the work to be performed in the laboratory. On this account no official announcement could be made as to what the laboratory was prepared to do, and the work, therefore, has consisted in doing whatever came to hand.

Since June Dr. Hewitt has been placing material formerly in his possession at the disposal of the laboratory, of which an accurate record has been kept and acknowledgment made.

It was found that the laboratory with these materials was so far from equipped that, at the meeting in July, a requisition was brought before the board for further supplies in the way of apparatus. This was passed, and the materials ordered.

Up to this time very little work had been attempted, and the little accomplished was done in the laboratory of pathology and bacteriology of the University of Minnesota.

In order to make it possible to do the work then or since, it has been found necessary to borrow material from time to time from the university. These have been for the most part returned, but owing to the delay in arrival of materials ordered from abroad even

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yet it would be impossible to continue the work without occasionally accepting this courtesy. It is a courtesy which this laboratory endeavors to reciprocate as far as possible. Apart from this reciprocity, the working of the laboratories is kept absolutely separated, and careful record is kept in all instances by both laboratories.

The total amount expended on the laboratory to Jan. 1, 1897, is as follows:

Salary of bacteriologist	$1,200.00
Salary of Dr. Wilson, from August	330.00
Furnishing and current expenses	726.90
Apparatus, etc., still to be paid to Noyes Bros. & Cutler	644.96
Current accounts with Noyes Bros. & Cutler still unpaid	35.02
Total	$2,936.88

Dependent upon the reasons previously stated, work was not properly begun until July, so that the list given below represents at most not more than six months' actual work.

Much work which would doubtless have come into this laboratory has been done in the laboratory established during the last year by the St. Paul board of health.

It is no more than just that the work of this laboratory should receive the credit which is its due. The value of this kind of work to a city is one which cannot be estimated in mere money, but is nevertheless so real that it should lead to the universal establishment of laboratories in connection with the health departments in all cities sufficiently large to support them.

In matters of interest to the state at large, as well as to St. Paul, the St. Paul laboratory has shown its willingness to collaborate with and place at its disposal any results or materials desired by this laboratory, which, in its turn, has endeavored to reciprocate in any way possible.

THE BACTERIOLOGICAL DIAGNOSIS OF DIPHTHERIA.

The necessary instructions issued to physicians in the matter of the collection and sending in of specimens from cases of suspected diphtheria can be found in "Circular of Information, No. 1," which

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follows this report, and which, with the sanction of the board, should now be issued.*

The culture medium supplied consists of Löffler's blood-serum mixture, to which 1.25 per cent of glycerine has been added to prevent the too rapid drying of the material.

Immediately on arrival of the specimen it is numbered, and marked with the date and hour. When time permits, from the swab, a cover-glass preparation is made and examined.

Observations made in this laboratory corroborate the experience of others, that from such examinations a positive diagnosis is rarely possible, and a negative diagnosis very unreliable. Hence, although it occasionally happens that a provisional positive diagnosis is given, it is always controlled by a later cultural examination.

The contents of the culture box are at once placed in the incubator, where they remain until a growth appears, if at all, usually in from five to twenty-four hours. The growth, if any, is then examined macroscopically, and microscopically after staining with Löffler's methylene blue, and a diagnosis of "Diphtheria," or "Not Diphtheria," made. Where no growth or a scant growth occurs after twenty-four hours, a statement of "no growth" is given and another specimen asked for. In any event a telegraphic or telephonic report is sent, if demanded.

The microscopic specimen is numbered and filed, while the original of the report blank (see "Circular of Information, No. 1"), together with all information concerning the case, is filed in an envelope bearing the case number, physician's name and date of receipt.

The duplicate of the report is mailed to the physician, and the triplicate to the secretary of the Minnesota State Board of Health. It might be well, perhaps, to send a copy of the report also to the local health officer. This has only occasionally been done. The following is a summary of the examinations made to Jan. 1, 1897:

During May	12 examinations.
During June	12 examinations.
During July	38 examinations.
During August	46 examinations.
During September	59 examinations.

*"Circular of Information, No. 1," owing to the apparent desirability of certain changes, was not issued until March 1, 1897. It has been revised and appears as "Circular of Information, No. 2," with the biennial report for 1897-98. (See page 181.)

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During October	160 examinations.
During November	284 examinations.
During December	312 examinations.
Total	923 examinations.

These examinations were distributed as follows:

Owatonna	351
Minneapolis	290
Austin	168
Spring Valley	13
Mabel	12
*St. Paul	11
Lyle	6
Scattering	72

From the first table it will be seen that this work is markedly increasing, which is perhaps the result of two factors: (1) More cases are probably now in progress than at the time when the examinations were begun; (2) physicians are rapidly coming to know that they can receive an early bacteriological diagnosis, and to appreciate its value.

It will be noted from the second table that more than one-third of the examinations made were from Owatonna. Most of these cases were from the state public school, and were under the professional care, first of Dr. Mary E. Bassett, and later of Dr. J. H. Adair.

The number of examinations made is not to be taken as an index of the number of cases of diphtheria occurring, for in this report are included examinations and repeated re-examinations of not only cases which were suggestive of diphtheria, but specimens collected from healthy individuals who had been possibly exposed to the disease. Dr. Adair, realizing the necessity of stamping out a disease which seemed to have become endemic, has been indefatigable in his efforts to locate the possible source of infection.

The zeal of Dr. Adair, together with the display of intelligent interest on the part of the management of the school, has given material for investigation of the varying forms of the *bacillus diphtheriae* in a place in which it has been long resident, and presumably widespread.

*These examinations were made with the consent of the St. Paul Board of Health, and for the convenience of physicians to whom this laboratory is more easily accessible than that of the local board.

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All cultures showing any peculiarity in biology or morphology have been preserved, and a large amount of such material is now in the laboratory demanding investigation., The impossibility from lack of time and sufficient assistance of doing this work at present as well as the persistence of a few cases of the disease in this locality, would seem to render it necessary to postpone a complete report until a later date.

It may be here mentioned, that specimens of water from various supplies at Owatonna, earth, sink-cleanings, milk, etc., were all examined for the presence of *B. diphtheriae*, with negative results.

Of the large number of examinations made from cases in Minneapolis, a great many were from the city hospital; the others were from cases occurring in the practice of physicians, from many of whom complaints were forthcoming in reference to the necessity of personally coming, or sending, to the laboratory for the obtaining of culture boxes, or return of specimens. These complaints probably arise on account of an apparent misunderstanding of the relation of the city of Minneapolis to the state board of health. Under the existing law Minneapolis has no legal right to expect the state board of health to help in the administration of her local regulations pertaining to diphtheria or other diseases.

It was to be expected, perhaps, that the Minneapolis department of health, in the absenec of any bacteriological laboratory of its own, should have approached this laboratory to ask that some agreement be arrived at whereby the physicians of Minneapolis could be supplied with culture boxes for the collection of specimens from cases of suspected diphtheria. It would apparently be only proper that various depots throughout the city should be established, from which physicians could obtain culture boxes for use, and to which they could be returned after use for transmittal to this laboratory.

The work of distribution and return of boxes to the laboratory, as well as reporting of diagnoses arrived at, should fairly fall to the city health department, where this board is willing to extend the courtesy of doing the necessary laboratory work.

As the Minneapolis health department has made no request, official or otherwise, for any such arrangement, and has given no official recognition to the work of this laboratory in its capacity of affording a common-sense basis for quarantine regulation, it would perhaps be as well that the bacteriologist of the state board of health be instructed to ascertain if it be not possible to come to some such arrangement for the simplification of the work of the laboratory on the one hand and the manifest benefit to the physicians and the department of health of Minneapolis on the other.

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Under existing circumstances much valuable time is daily lost by the constant interruptions caused by the giving out of culture boxes, receipt of specimens, or the necessity of repeated efforts to send telephonic reports to physicians, all of which work should be done by the city board.

The examinations made generally throughout the state seem chiefly to have been of value to the local physicians, as affording certain diagnoses in doubtful cases.

Very little information has been obtained of the local conditions, and from that available it would appear that a great necessity exists for the universal adoption of bacteriological examination as the only reliable means of diagnosing diphtheria. Subsequent examinations should be insisted on in all cases in which a positive diagnosis is given, until such examinations show the absence of *B. diphtheriae*, when quarantine may be raised.

Until compliance with these conditions is insisted upon by this board, in cases from which specimens are sent in for diagnosis, the work of this laboratory will have very little importance in the arrest of the spread of this disease, and will be largely but a convenience to physicians, as easily affording them a diagnosis upon which to base treatment, which should be but a part of its object.

Should observance of these conditions be demanded, the work done in this laboratory, and in the laboratories of local health boards, would furnish an accurate index of the health of the state, so far as this disease is concerned.

In the cases examined from Owatonna, Austin and the city hospital of Minneapolis, as well as some occurring in the practice of a few physicians, the request for subsequent examinations, where positive diagnoses have been given, has been complied with. Nothing further than a request has been made before bringing the matter before the board.

Some interesting observations have been made in regard to the persistence of *B. diphtheriae* in the throats of patients after the disappearance of clinical symptoms, as follows:

In two cases occurring at Owatonna (initials C. O. and G. O.) the micro-organism was present eighty-three and ninety-four days respectively from the time of admission to the hospital. In the case of C. O., the specimen taken on the day of admission showed the bacillus present, while in G. O., probably owing to the faulty method of transmittal, it could not be shown until the arrival of the next specimen three weeks later, the delay in sending having arisen from a misleading diagnosis of not diphtheria, made locally, based on a microscopic examination of material taken directly from

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the throat, without cultural control. In two cases, occurring in the practice of a Minneapolis physician, the bacilli were still present at the end of seventy-six and sixty-four days, and the investigation is not yet complete. In these cases, corrosive sublimate (1 in 1,000) was and is still being used locally in the throat.

The early disappearance of *B. diphtheriae* has been illustrated in some cases in which it could no longer be demonstrated after ten days from the commencement of the symptoms. Antitoxine had been used in the treatment of these.

The occurrence of *B. diphtheriae* in the throats of persons who showed no symptoms was exemplified in several cases occurring at Owatonna, as well as in the case of a nurse attending a diphtheria patient in Minneapolis.

These observations, corroborating, as they do, the experience of many laboratories, do not serve to demonstrate the futility of bacteriological investigation in showing the presence of the contagium, but rather tend to point out the necessity of careful isolation of the patients and the placing of restraint upon the movements of those brought into close contact with them.

The inability, through press of routine work, of complete tabulation and interpretation of the results of the examinations made, together with the present lack of opportunity to follow up the cultural and pathogenic investigation of the bacteria isolated from these many sources, preclude the immediate publication of anything in the nature of a scientific account of this work and the lessons to be learned from it.

No apology is then made for at present eliminating what is hoped may be given in proper form at a subsequent date.

THE DIAGNOSIS OF TYPHOID FEVER.

The universal interest aroused by Widal's announcement, in June last, of a possible early diagnosis in this disease, was intensified by the simplification of the process as pointed out by Johnston in September.

The simplicity of the method for arriving at such important knowledge in a disease so difficult of clinical diagnosis was sufficient reason for its immediate investigation in this laboratory. At Dr. H. M. Bracken's suggestion, the laboratory agreed to coöperate with him in the application of the test to such cases as could be brought under observation.

The results of this investigation Dr. Bracken has already made public at the last meeting of the Minnesota Academy of Medicine, and with his permission that paper as embodying the work of the laboratory is here laid before you. (See page 279.)

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In the work done in this connection assuredly the results obtained in this laboratory verify those already published in regard to the importance of the method as a means of aiding and controlling clinical diagnoses, but observations have not been sufficiently numerous nor extended to justify any further report than the foregoing. Investigations concerning other aspects of the question are being carried on, of which, if results warrant it, publication will be made.

With the sanction of the board, this method of diagnosis should now be placed at the command of the physicians and health boards throughout the state, if it be the opinion that such a proceeding will aid the work of the board in the detection, and consequent suppression, of this disease.

SPUTUM EXAMINATION FOR PRESENCE OF B. TUBERCULOSIS.

Of the eighty-four examinations made to January 1st the specimens came from the following places:

Minneapolis	35
St. Paul	7
Scattering	42
Total	84

The following is a copy of the report sent out to each physician:

MINNESOTA STATE BOARD OF HEALTH, BACTERIOLOGICAL LABORATORY (UNIVERSITY OF MINNESOTA), MINNEAPOLIS.

REPORT OF EXAMINATION OF SPUTUM FOR TUBERCULOSIS.

Case No.....Received.....
Patient's Name.....Address.....
Physician's Name.....Address.....
Health Officer's Name.....Address.....
Previous Case No.....
Remarks .....
.....
.....
Reported .....Result of Examination.....
....

Should the necessity arise for the examination of other fluids, or of tissues, for the presence of B. tuberculosis, special information and sterilized receptacles will be provided on request.

As will be easily understood, the data placed at the disposal of the board are useless under present legislation, by which human tuberculosis, when proven, is neither quarantinable nor reportable to the local health officer.

The matter of doing, or refusing to do, this work was left to the discretion of the laboratory by the action of the board at the July meeting, but the exercise of this discretion involves a large amount of correspondence, and the possibility of occasionally giving offense.

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By some physicians, under this regulation, the laboratory is simply looked upon as a convenience for their especial benefit, by which much of their time and money may be saved; and it would seem wiser, under the present legislation, that the attitude of the board for the time being be expressed somewhat in the language employed in the section on "Tuberculosis," in the "Circular of Information."

Should legislative measures such as those under which the health board of New York City operates ever be adopted, whereby all cases of tuberculosis are reported to the local health office without the necessity in every case of informing the patient of such a proceeding, some arrangement could be made with local boards for the report of all such cases to the state board.

Under these conditions the utility of bacteriological diagnosis would be very apparent, and such examinations should form a part of the routine work of this laboratory.

RABIES.

In all, fifteen inoculations were made with suspected material from three different sources—A, B, C.

A. On October 21st portions of the medullæ of two rabbits which had succumbed after inoculation with material taken from a child, in which death had resulted from supposed rabies, were examined. Some doubt existed as to the disease induced in the rabbits, and the experiments undertaken were to throw some light on the matter.

With doses of from 0.5 to 1 c. c. of emulsion of these materials rabbits Nos. 1, 2, 3, 4 were inoculated subdurally. The temperature of each was taken twice daily, for a period of thirty days, during which no symptoms occurred, nor did any arise in the next succeeding thirty days during which they were kept under observation. The absence of any symptoms during this period of sixty days would seem to cast doubt upon the original diagnosis* of rabies, which doubt was strengthened by subsequent experiments, as noted under B.

B. Material obtained from the cord of a rabbit which died twenty-seven days after inoculation with an emulsion of the brain of a brown setter dog supposed to have had rabies.

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*The fact that this material obtained from the rabbits was not used for about thirty-six hours after death of the animals may be mentioned as a possible reason for the results obtained. The delay was necessary, owing to pressure of other work.

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Four rabbits were inoculated—No. 6, No. 7, No. 8 and No. 9.

Rabbit No. 6.—A new animal; weight, 1,700 grams. Inoculated, December 19th, at 9:25 p. m., in left subdural space, with 0.5 c. c. of strong emulsion of B.

No symptoms appeared until January 8th, at 10 a. m., when a temperature of 40.6 degrees C. was observed. The animal, hitherto very active, showed weakness of right hind leg. January 9th, 9 a. m., rabbit stretched on belly with hind legs sprawling, unable to sit up or crawl. Lower jaw dropped. Died 9:35 a. m., or twenty and one-half days after inoculation.

Post Mortem Findings.—Brain slightly congested near seat of inoculation; much mucous in mouth and trachea; trachea and bronchi congested; bladder distended. Brain and medulla placed in pure glycerine.

Rabbit No. 7.—A new animal; weight, 1,850 grams. Inoculated on December 19th, at 9:50 p. m., with 1 c. c. of emulsion of B into left subdural space.

No symptoms until January 4th, at 5 p. m., when the temperature fell to 35.7 degrees C. Symptoms of loss of power of coördination of hind legs, twitching of muscles of back, relaxation of anal sphincter, spasmodic breathing, until death, at 8 p. m., or sixteen days after inoculation.

Post Mortem Findings.—Weight, 1,680 grams; small circular, circumscribed area of fibrinous exudate at seat of inoculation, about three-sixteenths of an inch in diameter. No other organs markedly affected. Cultures from emulsion of brain remained sterile. Rabbits Nos. 14 and 15 immediately inoculated with material from this animal.

Rabbit No. 8.—Same animal as No. 4; weight, 1,160 grams, having increased 120 grams since previous inoculation with A on October 21st. Inoculated in left subdural space with 0.5 c. c. of emulsion on December 19th at 10:15 p. m.

First symptoms were observed January 7th, at 2 p. m., which increased until death occurred, at 5:30 p. m., January 8th; that is, twenty days after inoculation.

Symptoms and post mortem findings as in No. 6, except that salivation was more pronounced, and gnashing of the teeth so great that tongue was bitten and blood escaped from mouth.

Rabbit No. 9.—Same animal as No. 1; weight, 1,650 grams, having increased 440 grams since previous inoculation with A, on October 21st. Inoculated in right subdural space with 1 c. c. of emulsion on December 19th, at 10:40 p. m.

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First symptoms were observed at 2:00 p. m., January 7th, and death occurred at 10:00 a. m., January 8th, or twenty days after inoculation.

Same symptoms as No. 8, but more marked.

Post mortem findings same as No. 6, but congestion and submucous hemorrhage in trachea more marked, and areas of congestion in lungs present.

These observations not only corroborate previous diagnosis of rabies in the dog from which the material originally came, but seem also to confirm the diagnosis of not-rabies in the child from which material A originally came, in that the previous non-lethal inoculation of A did not seem to protect* rabbits No. 1 and No. 4 (No. 8 and No. 9) against a subsequent inoculation of B. The inoculation period was also shortened in this series from twenty-seven to from sixteen to twenty and one-half days.

C. Material obtained from the medulla of a brown spaniel bitch, which had been under the observation of Dr. Richard Price, V. S., and in whose opinion the symptoms and post mortem findings justified a diagnosis of mute rabies.

With a strong emulsion of this material, four rabbits, Nos. 10, 11, 12, and 13, were inoculated subdurally, on December 20th. Rabbits Nos. 10, 12 and 13 all succumbed in from twelve to nineteen hours after inoculation.

In the post mortem examination no signs of local disturbance were to be made out, and nothing further than a very general venous congestion, especially in upper portions (jugulars in particular) could be detected. Press of other work unfortunately prohibited a careful autopsy.

Rabbit No. 11.—Weight, 775 grams. Inoculated in right subdural space with 0.25 c. c. of emulsion of C, December 20th, at 6 p. m.

The daily temperature remained normal, and no symptoms were to be noticed until January 7th, when typical symptoms of rabies, as exhibited in the rabbit, appeared. Death occurred at 10 a. m., January 8th, or less than nineteen days after inoculation.

Post Mortem.—Usual findings.

This experiment supported the diagnosis of the veterinarian, and from this rabbit a second, No. 16, was inoculated.

*How far this fact of nonprotection to a later inoculation of an undoubted virus can be taken as diagnostic must remain a matter of opinion at present.

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Rabbit No. 14, inoculated with material from rabbit No. 7.
Rabbit No. 15, inoculated with material from rabbit No. 7.
Rabbit No. 16, inoculated with material from rabbit No. 11.

These rabbits, Nos. 14, 15 and 16, are still under observation, and it is hoped that it will be possible to obtain, from further experiment, material of the greatest possible virulence for use in investigations in connection with certain phases of this work.

In all experiments the emulsion of the brain or cord used for subdural inoculation was examined for the presence of micro-organisms by making cultures. In no case has contamination been detected.

Daily temperature observations are made in every instance, and these and other records preserved in an envelope bearing the number of the animals, etc.

All of these observations have been carried on in collaboration with the St. Paul board of health bacteriological laboratory. The cases there observed will be reported elsewhere. It is here fitting to express the thanks of this laboratory to Drs. Rothrock and Price for their courtesy and for the materials and data placed at its disposal.

THE BACTERIOLOGICAL EXAMINATION OF WATER.

Very little could be attempted in the matter of the bacteriological examination of water, although the necessity of such work is very apparent. Some few partial examinations of the water supplied to the laboratory by the city pipes were made, but nothing further was to be observed than that the number of bacteria per c. c. was comparatively small, during May and June varying from 40 to 200 colonies. On one occasion *B. coli communis* was found.

Several examinations were made, at the request of the Owatonna public school management, in the search for *B. diphtheriae*, which resulted negatively, as previously stated.

The method usually employed in this search for *B. diphtheriae*, which may have been faulty, was as follows: To about 100 c. c. of the sample of water about 400 c. c. of a sterile one per cent dextrose broth was added, and the whole incubated for twenty-four hours, when Löffler's serum mixture tubes were inoculated, and agar and gelatine plates made.

The original and all subcultures were carefully examined for *B. diphtheriae*, but in no case was it, or any bacillus closely resembling it, found.

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BACTERIOLOGICAL INVESTIGATION IN HOG CHOLERA AND SWINE PLAGUE.

Only one series of investigations has been undertaken, which has unfortunately ended without result. No demand has arisen for investigation, except in the one instance, when the materials, improperly directed and without any information as to their character, or what was desired in regard to them, were received. The name of the sender and other information reached the laboratory only when, through the growth of putrefactive micro-organisms, the examination was rendered doubly difficult. Neither the bacillus of hog cholera nor of swine plague was to be found in the material examined (lungs, colon, spleen, stomach, liver), although *B. coli communis* and *B. pyocyaneus* were found. The sender was immediately notified, as soon as his address could be obtained, and he was invited to send further specimens from other cases. Full directions were given, but no reply was ever received to this communication.

The progress of these diseases in neighboring states, and according to reports* in this state also, seems to demand the active cooperation of all interested. Many points in which bacteriological examinations may aid the clinician will doubtless suggest themselves, and not the least conspicuous would be the determination of what percentage of cases occurring are hog cholera, what swine plague, and how many are cases of mixed infection.

While this laboratory is not at present in a position to publish results of scientific investigation, it would seemingly be wise to make some announcement in regard to what work the laboratory is prepared to do, and what is expected of those who desire to avail themselves of its services.

The following circular of information, which has been prepared with this object in view, is therefore submitted for the approval of the board:

F. F. WESBROOK, M. D.
Director.

*See report of superintendent of Farmers' Institutes, for 1896.

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SEVENTEENTH REPORT

OF THE

STATE BOARD OF HEALTH

AND VITAL STATISTICS

OF

MINNESOTA, 1897-98.

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Office of State Board of Health and Vital Statistics,
St. Paul, Minn., Dec. 31, 1898.

To His Excellency David M. Clough, Governor,

Sir: The state board of health herewith respectfully submits its report for the twenty-sixth and twenty-seventh years of its existence, embracing the time from Dec. 31, 1896, to Dec. 31, 1898.

HENRY M. BRACKEN, M. D.,
Secretary and Executive Officer.

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MEMBERS OF THE STATE BOARD OF HEALTH AND VITAL STATISTICS, 1897-1898.

FRANKLIN STAPLES, M. D., President ..... Winona

HENRY HUTCHINSON, M. D., Vice President ..... St. Paul

HENRY M. BRACKEN, M. D., Sec. and Ex. Officer..... Minneapolis

F. F. WESBROOK, M. D., Dir. Bac. Lab..... Minneapolis

M. H. REYNOLDS, M. D., V. M., Dir. Vet. Dept..... St. Anthony Park

*P. H. MILLARD, M. D..... St. Paul

WM. J. MAYO, M. D..... Rochester

CHARLES F. McCOMB, M. D..... Duluth

HENRIK NISSEN, M. D..... Albert Lea

†CHARLES L. GREENE, M. D..... St. Paul

(All official correspondence should be addressed to the Secretary, 515 Pioneer Press Building, St. Paul, Minn.)

*Died Feb. 1, 1897.

†Appointed April 29, 1897, to fill out the unexpired term of Dr. P. H. Millard.

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MINUTES OF THE

MINNESOTA STATE BOARD OF HEALTH

1897-1898.

Jan. 12, 1897.

The regular annual meeting of the board, called for 10 a. m., Jan. 12, 1897, in the secretary's office, was attended by the following members: Drs. Staples, Hutchinson, Bracken, Mayo, McComb, Reynolds and Wesbrook. The meeting was called to order at 10:55, with Dr. Staples in the chair.

Pending the confirmation by the senate of the recent appointments, on a motion of Dr. Mayo, seconded by Dr. Hutchinson, newly appointed members were considered as members, with right to vote and to take part in the proceedings of the board, without waiting for the confirmation.

Moved by Dr. Mayo, seconded by Dr. Hutchinson, that Dr. Wesbrook be appointed secretary pro tem., and that the election of officers be proceeded with.

The chairman (Dr. Staples) named Drs. Hutchinson and McComb scrutineers.

Dr. Staples, on nomination of Dr. Bracken, and supported by Dr. Mayo, was, after a unanimous ballot, declared elected president for the ensuing year.

Moved by Dr. Mayo, seconded by Dr. Hutchinson, that a secretary and executive officer be appointed pro tem. Carried unanimously.

Moved by Dr. Bracken, and seconded by Dr. Mayo, that Dr. Staples be appointed to the foregoing office. Carried unanimously.

Dr. Hutchinson, on nomination of Dr. Mayo, supported by Dr. Bracken, was unanimously elected vice president.

Dr. Mayo, after explaining that he was a member of the committee on contagious diseases of men and animals, and was familiar with the work of the bacteriological laboratory of the board for the past year, moved that Dr. Wesbrook be reappointed for the succeeding

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year, at a salary of $1,500; that Dr. Wilson's salary be made $1,200; that $600 be set aside for further assistants, and that a sum not to exceed $500 be appropriated for extending the present laboratory accommodations, the matter of current expenses to be left as before. Seconded by Dr Bracken, and carried unanimously.

The president said that it would not be possible at present to nominate any committees, and it was therefore decided to allow the matter to rest.

The reading of the secretary's report was, on a motion by Dr. Mayo, which was seconded by Dr. Hutchinson, left over to next meeting.

Moved by Dr. Bracken, and seconded by Dr. Mayo, that the report of the bacteriological laboratory and all other reports be left over to the next meeting, which, the president added, should be held, if possible, at an early date. Carried.

Dr. Mayo, in moving that $300 be voted to the president for his services during the past year, took occasion to allude to the amount of zeal and energy displayed by the president of the board in all matters pertaining to its efficacy and well being. Dr. Wesbrook seconded this motion, and it was unanimously carried.

After a prolonged informal consideration of the most suitable and convenient day and hour, Dr. Bracken moved that this meeting now adjourn till Saturday, 30th inst., at 1 p. m. Dr. McComb seconded this motion, and it was carried unanimously.

The meeting adjourned at 11:30 a. m.

F. F. WESBROOK,
Acting Secretary.

Jan. 30, 1897.

The adjourned meeting of the board met at the office of the same, and was called to order by the president at 1:20 p. m.

There were present Drs. Staples Hutchinson, Wesbrook, Bracken, McComb, Nissen and Reynolds.

Dr. Wesbrook read the minutes of last meeting.

Dr. Bracken moved that Dr. Wesbrook's title be made "Director of the Bacteriological Laboratory of the State Board of Health;" that all work of the laboratory be done and reported as by Dr. Wesbrook, but that Dr. Wilson be allowed to use the title "Assistant Bacteriologist" in any article written by him. Seconded and carried.

Dr. McComb moved that the board proceed to the election of officers, and that they take an informal ballot for the election of secretary. This was seconded by Dr. Hutchinson, and carried.

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The president appointed Drs. Wesbrook and Hutchinson as tellers. The ballot resulted as follows: Whole number of votes cast, 6—for Dr. Bracken, 5; blank, 1.

Dr. McComb moved that the ballot be made formal. Dr. Hutchinson seconded, and it was carried unanimously.

Portions of the financial statement for the years 1895 and 1896 were read.

The report of the former secretary was read. The president brought before the board the matter of an application for inspector at New Brighton, and a letter from the governor relating thereto. This was referred to the secretary for his action.

Dr. McComb moved that the report of the secretary be adopted, Dr. Hutchinson seconded, and it was carried.

Dr. Wesbrook read his report for the bacteriological laboratory.

Dr. Bracken moved that the report be accepted. Dr. Hutchinson seconded, and it was carried.

Dr. Wesbrook stated that he thought the laboratory should require a second specimen sent before removal of quarantine in any case where the laboratory had given a diagnosis of diphtheria.

Dr. Staples stated that, in the circulars, correspondence and work of the laboratory, care should be taken to avoid giving any of the physicians of the state the impression that, as the state board of health was making bacteriological diagnosis of suspected cases of diphtheria, they could wait for such diagnosis before reporting case to health officer, who must quarantine immediately, as suspected.

The matter of experimenting in the bacteriological diagnosis of enteric fever and the examination of sputum for tuberculosis was discussed.

Dr. Staples stated that there were good reasons for some physicians asking for, and the laboratory making, examination for tuberculosis.

Dr. McComb moved, and Dr. Nissen seconded, that the matter of revision and publication of the bacteriologist's report be left with the committee on infectious diseases. Carried.

Dr. Wesbrook moved, and Dr. Nissen seconded, that the president appoint a committee of two to draft a resolution, expressing the appreciation of the board of the services of the retiring secretary.

The president appointed Drs. Hutchinson and McComb.

Dr. Hutchinson reported for the committee on resolutions the following draft:

WHEREAS, Dr. Charles N. Hewitt, who has been the secretary of the Minnesota State Board of Health since the first organization of the board in 1872, and is now retired by reason of the expiration of his term of membership on the board; therefore,

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Resolved, That the members of this board hereby express their appreciation of the valuable services which have been rendered the state by Dr. Hewitt as secretary and executive officer of the state board of health during the time of its existence. It is well known that during this period, sanitary science and public hygiene have been greatly advanced in this country. In the work of this advancement the State of Minnesota from the first had an important part, and is known throughout the country as having good sanitary laws, organizations and arrangement. The credit of this important work in the state and the influence of the same throughout the country has been in a great measure due to the labors of the able secretary, Dr. Hewitt. The members of the board of health unanimously unite in this expression.

Dr. Nissen moved this resolution be adopted. Dr. Bracken seconded, and it was carried unanimously.

The secretary suggested that the committee on infectious diseases be divided into two committees, one a committee on infectious diseases of men and one on infectious diseases of animals; that Dr. Reynolds be chairman of the latter and that Dr. Wesbrook be a member of both.

The secretary moved that the action of the board in regard to the vaccine station be left with the executive committee, with power to act. Dr. Hutchinson seconded, and it was carried.

Dr. Wesbrook asked what action the board would take as to the chemical laboratory, stating that he had no desire to take charge of the work unless asked by the board, when it would become his duty to do so.

The secretary moved that an inventory be made, and that the apparatus of the board in this laboratory be left in Dr. Hewitt's hands until June 1, 1897. Dr. Hutchinson seconded, and it was carried.

The secretary stated that he thought the board should ask the legislature for a special fund for the investigation of infectious diseases of animals in the state, particularly hog cholera and swine plague. Dr. Reynolds stated that money was needed, not so much for investigation, but for dealing with diseases now prevalent among swine.

Dr. McComb moved that the executive committee be empowered to make a request to the legislature for a special appropriation for the board, for the purpose of dealing with infectious diseases of animals, and in particular, diseases of swine, in the state. It was seconded and carried.

The president brought up the matter of threatened suit against the local board of health of Richfield township, for quarantining animals suspected of tuberculosis. It was referred to the executive committee.

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Dr. Wesbrook asked what he should do about chemical examination of water. This was referred to the executive officer.

Dr. McComb moved that the board adjourn. Seconded by Dr. Hutchinson, and carried.

H. M. BRACKEN,
Secretary.

April 21, 1897.

Being an adjourned session from the regular quarterly meeting of April 13th (as agreed to by verbal and written communications with the secretary).

The board met at the bacteriological laboratory, after an informal session at the West Hotel, Minneapolis.

There were present at the informal session Drs. Staples, Hutchinson, Wesbrook, Bracken and Reynolds. Dr. Nissen wired that he was unable to be present.

The president called the formal meeting to order at 3:20 p. m.

All the above members were present except Dr. Hutchinson, who left his proxy with Dr. Staples.

The secretary read the minutes of last meeting. There being no objection, they stood approved.

The secretary then read his report for the quarter.

The financial condition of the board was discussed. Dr. Reynolds stated that he thought, as the secretary suggested, the "Disease of Animals Fund" should bear one-fourth of the expenses of the bacteriological laboratory.

Dr. Staples suggested that the secretary be instructed to take such action as found advisable to enable the board to draw upon this fund for such expenses, until it should have paid as near one-fourth of the total expense of the laboratory to date, as found best.

This was made the opinion of the board.

The matter of sending inspectors to investigate outbreaks of hog cholera was brought up, and it was decided that such should be done.

The director of the bacteriological laboratory then read his report.

The publication of the quarterly reports of the secretary, director of bacteriological laboratory and veterinarian was discussed, but no definite action taken.

Dr. Reynolds read a report of the work done by him during the quarter.

It was moved, seconded and carried, that the reports be accepted.

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The secretary presented an application from Mr. E. N. Eaton to make any necessary chemical analyses of water for the board. No action taken.

Dr. Bracken moved that the employment of a stenographer for Dr. Reynolds be continued; that the salary of the same be made thirty dollars per month, beginning May 1st. Seconded and carried.

Dr. Reynolds moved that the matter of clerical help for the laboratory be left with the executive committee. Dr. Staples seconded, and it was carried.

Dr. Reynolds requested the purchase of a typewriter for his department. This was also left with the executive committee.

The board adjourned at 5:30 p. m.

H. M. BRACKEN,
Secretary.

July 13, 1897.

The president, Dr. Staples, called the meeting to order at the office of the board at 1:30 p. m.

There were present Drs. Staples, Wesbrook, Reynolds, Bracken and Nissen.

Communications were received from Drs. Mayo, McComb and Greene, stating that they were unable to be present. Dr. Hutchinson was not in the city.

The president appointed Dr. Greene to the committee places lately occupied by Dr. Millard.

The secretary read the minutes of last meeting. There being no corrections or objections, they stood approved.

The secretary then read his report for the last quarter, after which there was a general discussion of several points mentioned in the report.

As to the matter of complaints by citizens against railroad stockyards at several points in the state, Dr. Reynolds thought the railroads were very often entitled to a decision in their favor.

Dr. Nissen thought that the board should instruct the local boards of health to inspect such yards at certain periods.

Dr. Staples stated that the board had the power to direct local boards to inspect such yards, and see that they are not allowed to become a nuisance; that they could only deal with the owners of such yards, and not with the shippers.

In a discussion of a complaint of this kind at Dodge Centre, Minn., Dr. Staples stated that they could compel the owners to abate

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any nuisance existing, but could hardly compel the owners to remove the yards.

The secretary stated that at Blooming Prairie the yards were without floors, and that shippers had informed him they would see that said yards were kept clean, if owners would put in floors. He asked if the board should take any action in helping railroads to enforce the "Twenty-four Hour Rule."

Dr. Staples told of the manner of procedure in such affairs at Winona, Minn.

In a discussion as to nuisances created by refuse from creameries, the secretary asked opinions as to best means of disposing of such refuse when the creamery was not located near any stream or body of water.

Dr. Wesbrook thought the exposing of such refuse to the sun in open tanks a practicable way.

Although expensive, the cartage away and sinking into the ground of such slops was thought by Dr. Staples to be advisable. He also spoke of the manner in which public dumps were handled in Winona. An ordinance provides that the local board of health shall establish a dump ground for privy refuse, dead animals, etc. This material is disposed of at such dump by means of burial. Where the owner of a dead animal is known, he is compelled to take it to the public dumping ground, and have it buried.

In a discussion as to quarantine for measles, the secretary stated that he did not think such quarantine advisable; that where quarantine was enforced people, disliking such restriction, would not report the existence of the disease nor call a physician. Complications and subsequent affections very often followed such a course because of the lack of a proper medical treatment.

Dr. Staples stated that in Winona measles was not quarantined, but all cases and suspected cases were kept from school.

The secretary suggested that the board issue a monthly bulletin to local health officers, etc., instructing them in their duties, etc.

The matter of selling advertising space in such a publication was discussed.

Dr. Staples moved that the secretary look up the matter of such a publication, with power to act. Dr. Wesbrook seconded, and it was carried.

Dr. Staples moved that the employment of S. D. Brimhall, V. M. D., as a "Field Veterinarian" of the board, at $1,800 per annum, be left with the executive committee, with power to act. Dr. Nissen seconded, and it was carried.

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Dr. Wesbrook moved that the continuance of employment of a live stock inspector at New Brighton be left with the executive officer, with power to act. Seconded and carried.

Dr. Bracken suggested that, as Dr. Reynolds has taken charge of all the work of the board relating to infectious diseases of animals, he be given some distinctive title, in addition to that of chairman of the committee on infectious diseases of animals.

Dr. Wesbrook moved that Dr. Reynolds be given the title "Director of the Veterinary Department of the State Board of Health." Dr. Nissen seconded, and it was carried.

Dr. Wesbrook read a report of the work of the bacteriological laboratory for the quarter.

Dr. Staples moved that the matter of extra compensation of Dr. Wesbrook's stenographer be left with the secretary and Dr. Wesbrook, with power to act. Dr. Nissen seconded, and it was carried.

The purchase of books for the use of the bacteriological laboratory was left with the executive committee.

Dr. Wesbrook asked if he would be permitted to contribute a paper to the coming meeting of the British Medical Association. No objections were made.

Dr. Bracken moved that Dr. Wesbrook be given leave of absence for one month, at such time as he found desirable. This was seconded and carried.

Dr. Reynolds read a report of his work for the quarter.

In a discussion as to means of stamping out hog cholera and other infectious diseases of animals, Dr Reynolds stated that he thought cars used for transportation of hogs were apt to be more or less infected with hog cholera, but that he thought it impracticable to attempt to compel a systematic disinfection of such cars.

Dr. Bracken moved that the matter of rules and regulations, as suggested by Dr. Reynolds, for preventing the spread of hog cholera and other infectious diseases of animals, be left to the committee on infectious diseases of animals, with power to act. This was seconded and carried.

Dr. Bracken moved that the action of Dr. Reynolds, in quarantining the stockyards at New Brighton and South St. Paul for hog cholera, be supported by the board. This was seconded and carried.

Dr. Reynolds suggested that the board vote fifty dollars to Mr. ....., of Warren township, Winona county, as several of his horses had been killed for glanders, and he needed the money to buy more to harvest his crop.

Dr. Staples stated that the law provided how the appropriations

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should be spent, and would not allow them to use any money in this way. No action was taken.

The board discussed the matter of tuberculosis in cattle, and methods and necessity of inspection.

Dr. Bracken thought that all cases condemned as tuberculous in St. Paul or Minneapolis should be reported to the board.

Dr. Reynolds suggested that slaughter be allowed only at certain times and at certain places.

Dr. Bracken moved that the making of rules and regulations be left with the executive committee, with power to act. This was seconded and carried.

Dr. Bracken moved that Dr. Reynolds be empowered to act as delegate to the meeting of the National Association of Veterinarians at Nashville, next September. This was seconded and carried.

Board adjourned at 4:25 p. m.

H. M. BRACKEN,
Secretary.

Oct. 12, 1897.

The meeting was called to order by the president, Dr. Franklin Staples.

Roll call: Drs. Franklin Staples, Henry Hutchinson, F. F. Wesbrook, M. H. Reynolds, Chas. L. Greene and H. M. Bracken, present.

The minutes of the previous meeting were read and approved.

Reports from the secretary, Dr. Bracken, from the bacteriological laboratory, by Dr. F. F. Wesbrook, and from the veterinary department, by Dr. M. H. Reynolds, having been sent out previously to each member of the board, in order that all might be familiar with the subjects coming up for discussion, the reading of such reports was dispensed with, and the following topics were taken up seriatim:

I. The Isolation of the Tuberculous Patients in State Institutions.
II. Distinct Supervision of the State Board of Health over the Sanitary Conditions of Jails, Prisons, Etc.
III. The Prohibition of Piggeries at Slaughter-houses.
IV. The Transportation of the Dead.
V. The Quarantine against Hog Cholera.
VI. The Teachings of Certain Self-Constituted Hog Doctors.
VII. Monthly or Quarterly Bulletin for the Board.
VIII. Antitoxine Circular.
IX. Yellow Fever.

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X. Clipping Bureau.
XI. Methods for Regulating the Meat Markets in this State.
XII. The Case of the Appraisal of Sick Hogs at Hammond, Zumbro Township, under the Jurisdiction of Mr. Howard.
XIII. The Case of Mr. Kahnke at Waseca.
XIV. The Question of Free Laboratory Services for Minneapolis.
XV. The Best Method of Dealing with the Man who Removed City Tags from Tuberculous Cows.
XVI. The Question of Extra Pay for Various Employes of the Board.
XVII. A Design for a Shipping Pen for Hogs.
XVIII. A Salary for Dr. Reynolds.
XIX. Recognition of Volunteer Service in the Laboratory on the Part of Dr. Fritz Baumann, Dr. J. D. McLaren, Dr. O. McDaniel, Mr. Magee, Mr. Hare, Mr. Gray, etc.
XX. Delegates to American Public Health Associations.

1. The question of quarantining the tuberculous inmates of state institutions was discussed. A motion was presented by Dr. Hutchinson, that the secretary be instructed to correspond with the superintendents of these various state institutions, relating to the manner of isolating the tuberculous individuals under their care. Motion seconded and carried.

2. In considering the question of state board of health supervision over the sanitary condition of jails, prisons, poorhouses, etc., attention was drawn to the fact, that, where these institutions were located in towns having a physician as health officer, it was his duty to look after the sanitary condition of such institutions located within his jurisdiction; that, where the health officer, or acting health officer, did not feel willing to assume the responsibility of such work, the state board of health should take the matter in hand. The work of the state board of corrections and charities, in connection with these institutions, was recognized as being very important. Finally, by motion of Dr. Wesbrook, the chairman of the committee on public institutions (Dr. Chas. L. Greene) was instructed to consult with Secretary Hart of the state board of corrections and charities, and to report at our next meeting.

3. The prohibition of piggeries at slaughter-houses, where the intent was to feed offal, was discussed. The arguments against such are: First, the danger from trichinosis and other communicable diseases in the eating of meat from hogs kept at slaughter-houses and fed upon offal; second, the inferior quality of such meat, regardless of dangers from communicable diseases; third, the maintenance of a public nuisance by establishing such piggeries.

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The general undesirability of such establishments was discussed. The secretary suggested that it might be wise to establish some rule for the benefit of the local boards, prohibiting such piggeries. That any such rule should be given a definite date, to go into effect at some time. By motion, the matter was left to the secretary and executive committee, to take such action as might seem advisable.

4. The question of regulations for the transportation of the dead was fully discussed. This subject is under consideration by the various railroads, by funeral embalmers, and by state board of health organizations. The matter was referred, by motion of Dr. Greene, to the executive committee, for further investigation, to report at the next meeting. Motion carried.

5. In the discussion relating to quarantine against hog cholera, the future, rather than the present, was under consideration. It was recognized that this board should be ready for a very active campaign against this disease with the opening of the spring of 1898.

The matter was referred for further consideration and report to the committee on infectious diseases of animals.

6. Reference was made to the harm that was being done by those who were going about the country persuading farmers and stockmen that hog cholera was not an infectious disease. It was recommended, on motion of Dr. Staples, that a special circular dealing with the infectiousness of hog cholera be prepared by Dr. Reynolds, taken from his present circular, but brief and emphatic. Motion carried.

7. The question of issuing a bulletin for the board was, by motion of Dr. Greene, again referred to the executive committee, with power to act. Motion carried.

8. The board indorsed the executive committee in its issuance of the antitoxine circular, and recommended the sending of such circular to all physicians in the state.

9. The question of expression of sympathy, etc., for the yellow fever sufferers was left to the executive officer.

10. Appreciation was expressed of the advantages to be derived from the clipping bureau.

11. Relating to methods for regulating the sale of meat through the state, and especially in the Twin Cities, the following resolution was adopted as a guide for action, and the matter referred for further action to the committee on infectious diseases of animals:

WHEREAS, There has been, and constantly is, an effort on the part of unscrupulous people to place upon our local markets the meat of animals that cannot pass the inspection of the government inspector at the packing houses; therefore be it

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Resolved, That the butchers of the Twin Cities be urged to give such assistance as will enable the state board of health to have a competent inspector, or inspectors, in order that the sale of meat from diseased animals may be prohibited absolutely within the cities' limits.

12. The case of the appraisal of hogs that had been exposed to hog cholera, and the killing of same, under the supervision of Mr. Howard, C. B. S., Zumbro township, Wabasha county, was taken up for reconsideration. The presentation of the matter by Dr. Reynolds showed that the action was taken in good faith by the board of supervisors, and the result of the action good, as there was no further spread of hog cholera in the neighborhood. It was therefore deemed advisable. and the secretary was instructed to pay the four-fifths of the appraisal value of these hogs (thirty-two dollars), the town having already paid its one-fifth.

13. No action was taken on the case of Mr. Kahnke, the breeder of hogs as Waseca. The matter was left in the hands of the secretary.

14. In connection with the service of the state laboratory for Minneapolis, the following resolutions were presented by the secretary, and recommended by the board as a working basis:

WHEREAS, The purpose of the laboratory of the state board of health is to impress upon all the importance of such work in the diagnosis of the many infectious diseases, and in the investigation of obscure diseases occurring both in men and animals; and,

WHEREAS, The purpose of such laboratory is, not to displace municipal laboratories, but rather to impress upon cities the necessity of such work; and,

WHEREAS, The work of the state board of health laboratory is limited by the means at its control; therefore be it

Resolved, (1) That the routine work for municipalities should not be allowed to cripple the legitimate purpose of this laboratory.

(2) That cities having a population of 100,000 or over be expected either to do for themselves the ordinary routine work of a bacteriological laboratory, or furnish the state board of health such financial assistance as will enable it to do the work without crippling it in its regular duties.

(3) That the state board of health urge cities having a population of 10,000 and upward to establish bacteriological laboratories of their own.

(4) That the state board of health do everything in its power to assist the organization of such laboratories.

(5) That there be a close relationship maintained between the state board of health and the various municipal bacteriological laboratories throughout the state.

Dr. Hutchinson presented a report of his meeting with Dr. Avery, health commissioner of Minneapolis, to consider this matter of laboratory service. Dr. Avery felt that the city had no right to demand

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such services as the state laboratory was now giving without compensation. He states, however, that some members of the Minneapolis board of health thought the city was entitled to all it was receiving, and that the state could be compelled to give such service. Dr. Avery was of opinion that the city board of health might be persuaded to pay $400 per annum to the state for laboratory work, and that probably the city's board of corrections and charities would also be willing to pay $400 per annum for such services. He stated that a local physician had expressed his willingness to do the bacteriological work for the city of Minneapolis for $400 per annum.

By a motion of Dr. Greene, this matter was referred back to the executive committee, with power to act. Motion carried.

15. On presentation of the case of the man Anderson, in Fridley township, who apparently removed tags that had been placed in the ears of tuberculous cows by Dr. Cotton, veterinarian for Minneapolis, the necessity of adopting some indelible means of marking such animals was dwelt upon. The fact that the city veterinarians of the Twin Cities had expressed a willingness to use such brand for marking these animals as the state board of health should see fit to put into their hands was also dwelt upon. Finally, by motion of Dr. Wesbrook, the question of marks for condemned animals was referred to the committee on infectious diseases of animals. Motion carried.

16. Dr. Reynolds expressed a wish that the salary of his stenographer, Miss Carroll, be increased by the amount of five dollars a month, stating as a reason that she was faithful and competent, and that she was doing more work than other stenographers with whom she was working, although they were receiving ten dollars more a month than she.

Dr. Wesbrook made a request for an increase of salary for Dr. Miller, assistant in the bacteriological laboratory, for Mr. Moorhead, stenographer, and for "Harry," the laboratory boy.

The finances of the board were shown to be such that, in spite of any wish to give these people their dues, there could be no increase in expense along these lines. The only exception was that of "Harry." Dr. Wesbrook was instructed to retain him at ten dollars a month, if possible, but that rather than lose him, to pay twelve dollars.

18. In reference to Dr. Reynolds, the attention of the board was drawn to the fact that he should have some regular compensation for services rendered. Dr. Hutchinson moved that he be given fifty dollars a month. Motion carried.

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19. Dr. Hutchinson moved that an expression of thanks be presented by Dr. Wesbrook to Drs. Fritz Baumann, J. D. McLaren and O. McDaniels, also to Messrs. Magee, Hare and Gray, for gratuitous services rendered in the laboratory. Motion carried.

20. Dr. Hutchinson moved that the secretary and Dr. Wesbrook represent this board at the regular meting of the American Public Health Association at Philadelphia the last of October. Motion carried.

21. Dr. Wesbrook suggested that a circular, furnishing information relating to the infectious character of tuberculosis and the best means of preventing such infection, be prepared by the secretary for distribution. The matter was referred to the executive committee for action.

22. Dr. Wesbrook advised rules setting forth the quarantine of diphtheria; that such disease should be quarantined until at least two negative bacteriological reports as to the presence of *B. diphtheriae* should have been made. No action taken.

Meeting adjourned.

H. M. BRACKEN,
Secretary.

Jan. 11, 1898.

The meeting was called to order by the president, Dr. Franklin Staples, at 2 o'clock p. m.

Roll call: All the members of the board were present, viz., Drs. Franklin Staples, Henry Hutchinson, F. F. Wesbrook, Wm. J. Mayo, M. H. Reynolds, Chas. F. McComb, K. H. E. Nissen, Chas. L. Greene and H. M. Bracken.

The minutes of the previous meeting were read and approved.

Election of officers resulted in the choice of Dr. Franklin Staples, president; Dr. Henry Hutchinson, vice president; Dr. H. M. Bracken, secretary and executive officer.

The reports from the secretary, Dr. Bracken, and from the director of the bacteriological laboratory, Dr. Wesbrook, having been previously sent out to each member of the board, were ready for discussion without further reading. The report from the director of the veterinary department, Dr. Reynolds, having unavoidably been delayed until too late for presentation by mail with the other two reports, was read in part by Dr. Reynolds.

In connection with the bacteriological work done for Minneapolis, Dr. Mayo moved that the proper authorities in Minneapolis be notified, that, after March 1, 1898, the state board of health can no longer do the general laboratory work for Minneapolis, unless

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said city pays its proper proportion of the expenses connected with such work. Motion carried.

This matter was referred to the executive committee, with power to act, on the suggestion of Dr. Bracken.

The various committees were called upon for reports. None had reports to offer. Thereupon, Dr. Hutchinson proposed the following:

Resolved, That the action taken two years ago, creating these various committees, be revoked, and that the present executive committee be so changed as to include the officers of the board, with the heads of departments.

This resolution was seconded and carried unanimously.

On motion of Dr. Bracken, Dr. Wesbrook was appointed director of the bacteriological laboratory for 1898.

On motion of Dr. Hutchinson, Dr. Reynolds was appointed director of the veterinary department for 1898.

Dr. Bracken moved that Charles Tilbury be appointed deputy meat inspector, with the conditions outlined in his report. Motion carried.

Dr. Mayo moved that, after March 1, 1898. the feeding of hogs at slaughter-houses, or upon the offal from slaughter-houses, should be prohibited, for the reasons assigned in Dr. Bracken's report. Motion was seconded by Dr. Greene and carried.

Of unfinished business, the outlining of work in the laboratory (requested in Dr. Wesbrook's report), together with methods for dealing with tuberculosis among men or among animals and with hog cholera, was referred to the executive committee, by motion of Dr. Hutchinson. Motion seconded and carried.

Dr. Greene moved that no examination of sputum be made at the state laboratory, except upon request from a health officer or acting health officer. Motion seconded and carried.

The appointment of Dr. O. McDaniel as assistant bacteriologist was confirmed.

Under the head of "New Business," matters pertaining to the following subjects were all referred to the executive committee:

1. The Formulation of Rules.
2. The Arrangement of Meetings for Sanitarians.
3. The Question of Regulating the Quarantine of Diphtheria by the Bacteriological Reports.
4. The Examination of Water—
   (a) Bacteriologically.
   (b) Chemically.

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5. Matters Pertaining to Research Work in the Laboratory.

The question of using money from the infectious diseases of animals' fund for laboratory purposes was, by motion of Dr. Hutchinson, referred to the executive committee.

The request of Dr. Reynolds for an increase of salary for his stenographer, Miss Carroll, to forty dollars per month, was granted, through motion of Dr. Wesbrook.

The general questions for discussion in Dr. Reynolds' report were, by motion of Dr. Bracken, referred to the executive committee.

Dr. Nissen reported the action of the health officer at Albert Lea, who stated that a case reported and treated by Dr. Nissen as diphtheria was not such, and who refused to quarantine the case. It was explained to Dr. Nissen that the health officer had exceeded his authority in thus disputing the diagnosis of a physician.

By motion of Dr. Mayo, a salary of $300 was voted to Dr. Franklin Staples, for services rendered as president of the board for 1897, Motion seconded and carried.

By motion, the board adjourned.

H. M. BRACKEN,
Secretary.

April 12, 1898.

The meeting was called to order by Dr. Hutchinson, vice president, at 2:30 p. m., Dr. Franklin Staples, president of the board, not being able to attend.

Roll call: Drs. Hutchinson, Wesbrook, Reynolds, Greene, Nissen and Bracken present.

The minutes of the previous meeting were read and approved.

The reports from the executive department, bacteriological department and veterinary department all having been put into the hands of each member of the board previous to the meeting, the reading of the same was dispensed with.

The following sets of rules, as set forth in the reports, were indorsed:

1. Rules to govern the granting of special license to embalmers.
2. Rules to govern the transportation of the dead.
3. Rules applying to the executive work of the board.
4. Rules governing the work of the veterinary department.

New regulations to govern the quarantine of diphtheria and scarlet fever, as set forth in the secretary's report, were adopted.

It was thought well to consider carefully the relation of the state board to leprosy. The secretary was therefore instructed to call a

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meeting, at some convenient time, of members of the state board and leprologists throughout the state.

It was moved by Dr. Greene that the petition relating to shipping pens at Albert Lea be held over for consideration at the next regular meeting. Motion carried.

The executive committee was instructed to draw up rules for disinfection, and to report the same at the next regular meeting of the board. (Note Dr. Wesbrook's report.)

The board deemed it advisable that some one competent should visit the state school at Owatonna, and work with the authorities there in their efforts to control diphtheria. Dr. Wesbrook was instructed to take this matter under consideration, and either to go in person or send an assistant to Owatonna.

The new circular of information was presented by Dr. Wesbrook, and indorsed.

The transmission of material to the laboratory by mail, as governed by the new postal regulations (Postmaster General's Order 677, December, 1897), was discussed but no action taken.

The following questions were referred to the executive committee, with power to act:

1. Granting of state authority to the federal government inspector at New Brighton.
2. Granting state authority to inspect meat and infected animals to Dr. Price or to Mr. Jansen, or to both, in St. Paul.
3. To release Mr. Pomplun from the employ of the board. (Notice sent April 14th, to take effect May 15th.)
4. The formulating of new rules to govern the quarantine of hog cholera.
5. The rearrangement of districts A and B, as related to hog cholera.
6. The questions brought up by the petition from Albert Lea, as relating to shipping pens in that city, suggested the advisability of a conference between the executive committee and railroad officials to discuss the location and general care of shipping pens. Dr. Greene presented a motion to that effect, which was carried.
7. The placing of capable men in the field to instruct as to the best methods for controlling the spread of hog cholera.

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July 12, 1898.

Regular meeting of the state board of health.

Present: Drs. Franklin Staples, Henry Hutchinson, M. H. Reynolds and H. M. Bracken.

There being no quorum, no business could be transacted. Word had been received from Drs. Nissen and Mayo of their inability to attend the meeting. Dr. Wesbrook was absent on sick leave. Dr. McComb of Duluth and Dr. C. L. Greene of St. Paul were the other members absent.

Oct. 11, 1898.

Dr. Franklin Staples, president, not being able to be present, the meeting was called to order by the vice president, Dr. Henry Hutchinson.

Roll call: Drs. Hutchinson, McComb, Nissen, Wesbrook, Reynolds and Bracken present.

The minutes of the previous meeting were read and approved.

The reports from the executive department, the bacteriological department and the veterinary department having already been submitted to each member of the board for perusal, the topics presented in them were open for discussion without further reading.

Under the head of unfinished business were presented also the following:

The attitude of the Minnesota state board of health to lepers in the state. The secretary stated that it had been impossible to call leprologists of the state together since the April meeting, because one of these gentlemen had been absent from the state the greater part of this time in the service of the United States army. The secretary had presented a paper at the American Public Health Association meeting at Ottawa, September, 1898, entitled, "Leprosy in Minnesota and the Northwest." This was outlined and discussed. Instructions were given for further consideration of this subject before the next meeting of the board.

The secretary reported his visit to Albert Lea, to look into the condition of the shipping pens at that point. His report, as set forth in the following letter, was accepted and approved:

Oct. 10, 1898.

Hon. Chas. M. Wilkinson, Mayor, Albert Lea, Minn.,

My Dear Sir: Under date of October 9th, I received a letter from one of your citizens setting forth the objections to the stockyards in your city, stating also that the city council was petitioned to order the removal of said yards, said petition being signed by 180 families. The letter further states that the city council had ordered the removal of the Chicago, Milwaukee & St. Paul Railroad shipping pens, and that the pens of the Burlington, Cedar Rapids & Northern and of the Minneapolis & St. Louis Railroads be kept in better sanitary condition.

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The methods of dealing with shipping pens, from a sanitary point of view, is a broad one, and the delay on my part in looking after the pens at Albert Lea has been due to the fact that I have been studying the question thoroughly, in order that, with a proper understanding of the conditions, my action might be just to all parties concerned.

On October 8th I visited the shipping pens in your city, with your health officer, Dr. Blackmer. As a result of this visit, my advice is as follows:

Let the shipping pens of all railroads stay where they now are. Insist on the railroads keeping their pens in good sanitary condition. This last can be done, provided the pens are properly constructed. To begin with, there must be good floors. These floors should be cleaned often enough to prevent any accumulation of manure. There is less reason for shipping pens becoming a public nuisance than for livery stables, for the pens have the sunlight upon them, while stables soon become saturated with the odor of manure. It might be a good plan to make some arrangement with the railroads by which the cleaning of the pens would be looked after by your city authorities, either being under the control of your health officer or your street commissioner. By this I mean a financial arrangement. This would be an excellent plan for all parties concerned. If the railroads are not willing to make such an arrangement, then they themselves must be required to keep the pens clean. It is a common custom in many places not to clean shipping pens oftener than twice a year. Such action should not be tolerated. Pens should be cleaned often; at least once a week during hot weather, and even oftener, if there is much shipping going on.

I am inclined to think that cement would make the best floors for the Chicago, Milwaukee & St. Paul Railroad shipping pens, for there is, at present, constant oozing through some of the plank floors, and this cannot but be a source of annoyance. The drainage for these pens should naturally be into sewers, but the railroad cannot be required to build sewers for the city. When the city has a sewerage system within a reasonable distance from the pens, then the railroad should be required to make sewer connection.

It may be well to consider the question of location for the Chicago, Milwaukee & St Paul Railroad pens, the present site or the newly purchased site. From a sanitary point of view, it should make little difference which of these sites is used. The railroad, however, has a legal right to its present site that it might be difficult to secure at the other property. The pens of all roads have been so long located where they now are that transfers of land adjoining them have been upon a recognized basis. Moving to a new site might affect the value of neighboring property very decidedly, and would in all probability be resisted. It has been suggested, even, that the pens be ordered outside the city limits. This would be a very unwise thing to do, both from a business and sanitary standpoint. It would probably damage the shipping interests of your place very decidedly, and it would place the sanitary control of the yards beyond your reach.

There is too much loose hay, etc., about these pens. Your city authorities should prohibit this.

It is needless to say, I presume, that any action taken by your city, looking to the sanitary condition of shipping pens, should be the same for all roads within your city limits.

In summing up, my advice is as follows:

1. Keep pens where they now are.
2. Insist on good floors in pens,—cement, by preference, although ties might pass.
3. Require underdraining of pens.
4. Require connection of said drains with sewer when the city has a sewer within reasonable reach of pens.
5. Require pens to be kept clean.
6. Require shippers to limit the amount of hay on hand at the pens and to keep the hay in compact form.

Respectfully,
(Signed) H. M. BRACKEN,
Secretary.

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No action having been taken by the executive committee in drawing up rules for disinfection, the request was renewed for a report at the next regular meeting.

Dr. Wesbrook reported that it had been impossible for either himself or his assistant, Dr. Wilson, to visit Owatonna, as instructed to do at our April meeting, and stated that one or the other would do so soon, and be able to report at our next meeting.

The government inspector at New Brighton, Dr. Keane, was given authority to act also as state inspector, without financial compensation from the state, as requested at our April meeting. A verbal report was given by the secretary, concerning action taken by said Dr. Keane, in condemning many lumpy-jaw cattle and other diseased animals that had come under his notice. A vote of thanks was passed for the work done by these inspectors at both South St. Paul and New Brighton, and the secretary was instructed to advise the inspectors of this action.

Dr. Bracken's motion that the new rules of the board, relating to the transportation of the dead, should go into effect Nov. 1, 1898, was carried.

The rules relating to the control of sanatoria, hospitals, etc., where tuberculous patients were under treatment, were referred back to the executive committee for further consideration, and to be reported upon to the board at its next meeting. It was suggested that Rule 1, as presented in the secretary's report, be expunged, and that a punishment for noncompliance be specified in the regulations.

On motion of Dr. McComb, the recommendation of the executive committee, relating to the adoption of the Bertillon classification of causes of death, was accepted.

The resolutions presented to the various state boards of health by the last conference of state and provincial boards of health, relating to tuberculosis, were, by motion of Dr. Bracken, referred to the executive committee for consideration, to be reported upon at the next meeting of the board.

The case at Walker, Minn., relating to the shipment of the remains of one who had died of diphtheria, as due to acute laryngitis, was referred to the secretary to close, by motion of Dr. McComb.

The investigation of possible diphtheria at the school for the blind (at Faribault) was, by motion of Dr. McComb, referred to the executive committee.

Dr. Wesbrook's request, that Dr. Wilson be permitted to act as head demonstrator of pathology and bacteriology in the medical department of the university, was, on motion of Dr. McComb, granted for the present school year only.

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The request that Dr. Brimhall be permitted to spend his spare time in the state board of health laboratory was granted. This action was recognized as of material advantage to both the veterinary and bacteriological departments.

It was decided that the finances of the board required the discontinuance of the services of Dr. Annand after Nov. 1, 1898, and the secretary was instructed to notify him of this fact.

The action of the executive committee in making Mr. A. K. Bush of Dover special agent to aid in the control of hog cholera, was indorsed by the board. The question of giving Mr. Bush financial compensation for services rendered, under necessary conditions, was referred to the executive committee, with power to act.

The suggestion of the secretary in his report, to the effect that the state board of health, through the veterinary department, should cooperate with the various institutions in an effort to suppress tuberculosis in dairy cattle belonging to these institutions, by means of semi-annual inspection of such cattle, was indorsed, and instructions were given that such action should be taken. This, upon the motion of Dr. McComb, carried.

Dr. Nissen reported the removal of quarantine, in a case of diphtheria in Albert Lea, before the time limit set by the state board. The secretary was instructed to investigate, and to take such action as he might deem best.

In discussing the quarantine of diphtheria, the point was made that all exposed persons should have a bacteriological examination of the throat before being released from quarantine, upon appearance of the disease for the first time in a house.

Adjourned.

H. M. BRACKEN,
Secretary.

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QUARTERLY REPORTS

OF THE

SECRETARY AND EXECUTIVE OFFICER,

1897-1898.

April 21, 1897.

On February 1st my duties began as secretary of this board. Since that time the affairs in the office have gone along in regular routine.

The various committees have been appointed by the president for the year, as follows:

Executive—Drs. Bracken, Hutchinson, Wesbrook.

Diseases of Men—Drs. Wesbrook, Bracken, Mayo.

Diseases of Animals—Drs. Reynolds, Wesbrook, Hutchinson.

Statistics—Drs. Hutchinson, Millard, Nissen.

Water, Sewage, and Drainage—Drs. McComb, Wesbrook, Hutchinson.

Food Adulteration, Poisons, and Explosives—Drs. Nissen, Millard, Reynolds.

Travel, and Transportation of Dead—Drs. Mayo, McComb, Nissen.

Public Institutions, and Hygiene—Drs. Millard, Mayo, Reynolds.

The board has lost one of its most indefatigable workers through the death of Dr. P. H. Millard, which occurred at Johns Hopkins Hospital, Feb. 1, 1897.

A new inspector, W. J. Pomplum, has been appointed at the New Brighton stockyards to take the place of W. H. Wittey, the former inspector. The reason for the change was the fact that Mr. Pomplum lived at New Brighton, and could practically be on duty at all times, while the former inspector lived far out in the southern suburbs of Minneapolis, and could not possibly be at the stockyards at New Brighton more than a few hours of each day.

The circular of information of the bacteriologist has been printed and is ready for circulation.

The biennial reports of the board and the report on vital statistics are in the hands of the state printer.

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An inventory was taken of the contents of the chemical laboratory in the mechanic arts building, at the university by Mr. H. C. Carel, a former assistant of Dr. Hewitt's. The inventory is placed on file. It had been the intention, according to the action expressed at our last meeting, after taking this inventory, to leave this apparatus, etc., in the hands of Dr. Hewitt until June 1st, but word coming to me indirectly that Dr. Hewitt did not want the responsibility of these things resting on him after the inventory had been taken, arrangements were made for turning the entire laboratory outfit over to Dr. Wesbrook, such part as he needed going to the bacteriological laboratory and the rest of the outfit for storage in the laboratory building.

Permission was given to Dr. Hewitt to retain certain books reported in this inventory, until June 1, 1897.

Dr. Reynolds, as chairman of the committee on infectious diseases among animals, has been carrying on quite active correspondence, and I have asked him to make a report to you of what he has done. The amount of work that he has been doing seemed to demand the services of a stenographer, and with the advice of Dr. Staples, our president, and other members of the board, such action has been taken, at a cost of twenty-five dollars a month.

Dr. Wesbrook has a report to present to you, as director of the bacteriological laboratory. He, too, has been burdened with correspondence, and as it was not thought wise to use the time of the bacteriologist in correspondence when it might better be used in laboratory work, a clerk for part of each day has been provided, at a cost of twenty dollars a month.

It has been necessary to make a few chemical analyses of water. This has been done at the chemical laboratory of the medical department of the university. Bills have been rendered for such services, and paid for in the usual way.

The lease for our present quarters should expire April 16th. I have arranged with the superintendent of the building to extend the rent at the present rate until May 1st. There was a feeling on the part of the executive committee that we were at present paying too high a rental, viz., ninety dollars a month. Different offices were looked at. It was found that we could secure very good quarters in other buildings at rates ranging from fifty dollars upwards. The Pioneer Press Building made us a proposition for rent of our present offices at $800 per annum, $280 less than we are now paying. The question of our accepting this proposition should be considered to-day.

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I have made two trips of inspection. First, March 14th, to Mountain Lake, to investigate an outbreak of typhoid fever. At the time of my visit there were thirteen patients ill from this one disease in this village. Four patients had already died. The question of closing the school had been under consideration by the school board. I advised against this, and gave suggestions as to proper sanitary precautions to be carried out in the town. The local board seemed willing and ready to give all the assistance possible in controlling the disease.

Examinations of water have been made from two wells in this place. (1) The well that was considered as most likely to give a pure water because of its depth (eight hundred feet) and location on a hill. This was a well upon which several of the villagers depended for their drinking supply of water. (2) A shallow well (30 feet) in the sand. Typhoid bacilli were not found in either of these waters, but the general character of the water was such as to make it advisable that both wells should be condemned. The local health officer, Dr. Julius Friesen, was accordingly advised to condemn the shallow well, and to have further examination of the water from the deep well made before it was pronounced suitable for use. Under date of April 10th, I am informed that only two new cases of typhoid fever have occurred in Mountain Lake since my visit. It would seem, therefore, that the epidemic was practically over.

Second, March 25th, I went to Adrian, on complaint of Mr. Frank Bittner, to investigate hog cholera. I found that hog cholera had been very prevalent throughout the western part of Nobles county during last fall. The townships which had suffered most were Leota, Lismore, Westside, Grand Prairie, Wilmot, Larkin, Olney and Little Rock. The estimated loss, last fall, in Lismore township alone, was 1,600 hogs. Great carelessness has existed in handling this disease. Sick hogs were allowed to run with well hogs, no attempt being made at quarantine. Not only this, but sick hogs were turned out on the highway to die, to save the owner the trouble of burying them; and a so-called "dead hog man" was in the habit of driving about with a wagon, gathering up these infected carcasses and carting them across the country to some shipping point, from whence they were sent to certain rendering establishments.

The shipping pens at Adrian were thoroughly infected. Infected hogs had been received at this point and shipped to Chicago. The general (and natural) tendency is for everyone, as soon as he thinks his hogs are infected, to haul them to town and ship them

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to the various packing houses. It seemed as though everything that possibly could be done to spread the disease had been done. In some places there were numbers of dead hogs unburied that had been piled up all winter. The disease has been in abeyance during the winter, but the day I reached Adrian one man had hauled ninety hogs to town for shipment, having discovered hog cholera present in his herd. Of these ninety, thirty were either dead or killed the next morning, and the rest were shipped to Chicago. With this evidence of a fresh outbreak, I made it a point to see as many of the various town officers as possible, by driving to their homes or by watching for them in town (Saturday), and advising them to do everything in in their power to prevent the spread of this awful scourge. There was a general willingness to do everything possible to control the disease. At the same time, there was the generally expressed opinion that a stranger could do, in matters of quarantine, etc., what a neighbor could not do. Recognizing this fact, it is my wish that a veterinarian be sent to this county to watch for fresh outbreaks, and to instruct the people what to do and how to do it in caring for this disease. Such an inspector should have tact as well as knowledge, and should make visits of such frequency as to keep himself in close touch with the condition of things.

Because of the financial condition of the board, no inspector has as yet been sent, but I am keeping myself in touch with this locality by correspondence, and hope, should occasion arise, to be able to carry out my wish in this matter of educating the people up to the proper means for limiting the spread of this infectious disease. I have heard from the health officer at Adrian, Dr. C. C. May, under date of April 12th, to the effect that there had been no new cases of hog cholera in that neighborhood. He reported that the carcasses of hogs that had been thrown along the banks of a stream which passes through Adrian had been floating down the stream with the spring freshets, and had been deposited over a distance of four miles or more, within the boundaries of at least three townships. The doctor has had the carcasses found along this stream, in the township over which he had jurisdiction, buried. I have communicated with the town officers of three adjoining townships, requesting them to look after carcasses within their jurisdiction.

It has been the custom every spring to send out to the several townships a request for the names of the newly elected officers. A return envelope with proper blanks for making such reports has been sent with such requests. This year the idea of using the return postal card suggested itself to me. The result has been most

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satisfactory, for out of 1,407 cards sent out 1,263 have been filled and returned promptly. Of 144 sent out the second time, 125 have been returned, leaving but nineteen townships to hear from, a result much better than at any time in the past. This system was also cheaper than the old one.

To Dr. Reynolds belongs the credit for the issuance of individual blanks for making tests with tuberculin and mallein, as also a record sheet for the tuberculin tests.

Dr. Hewitt has made the following report for the vaccine station:

To the State Board of Health of Minnesota:

The following report should have been submitted to you at the meeting following the expiration of my service, but was forgotten. I respectfully submit it now.

When I proposed to venture the establishment of a vaccine station in 1890 the board agreed as to its necessity, and to support it till it could stand alone, if that were possible. I began work in a limited way, and the board paid the actual outlay, $98.58. There was no income. In 1891, the board contributed $780.52. During this year the station furnished, for the control of small-pox in Duluth and St. Paul and to the hospital for insane at Rochester 1,120 points, of which the wholesale value was $48.30. The income from sales was twenty-eight dollars.

In 1892 the board paid $490.33. The station furnished 805 points for the board's use, of the value of $48.30. The income from sales was $135.83. In 1893 the board paid $289.48. The station furnished for use of the board 4,250 points. Eight hundred were issued and 3,430 were refused other sale, and reserved for emergency till useless; the value was $255. The sales were $252.11. The board has contributed nothing towards the expenses of the station since Jan. 1, 1894. The receipts from the board and from sales up to this date went to actual outlay for animals, their feed and for hired help, so that at the beginning of 1894 there was eight dollars on hand. Since Jan. 1, 1894, the station has been self-supporting (that is, has paid running expenses), and up to Jan. 11, 1897, when my service with the board ceased, I had received nothing for my personal service, though I had given it all my spare time and attention. Up to this last date the station has furnished for the use of the board, through local boards. the state institutions, and for emergency, 26,240 points of vaccine, of the wholesale value of $1,574.70, nearly the total amount of the money paid by the board.

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The demand for vaccine is a very irregular one, but if it had not been for the demand from the United States army, from Manitoba, from Maine, and in smaller amounts outside the state, I could not have paid expenses. The most constant demand in Minnesota has been from the health commissioners of St. Paul, Drs. Hoyt and Stone. Since Jan. 1, 1897, the sale has not been $100. There have been no demands or sales through your office.

For the future, all I ask of your board is that which is done by other state and provincial boards, to urge the need for vaccination in the schools, and for infants, and to urge the use of the product of this station. The Maine board distributes it from their office, permitting one of the secretary's assistants to serve, and advertising it in their bulletin.

I feel that a good work has been done in the establishment of this station, and that the board served a noble purpose when it helped it to begin. I propose to keep it going as long as I can, and to keep its product up to the highest efficiency.

I ask no further help than to advise its use when possible.

Very respectfully,

CHARLES N. HEWITT.

Our financial condition demands attention. We have increased the demands upon the board's appropriation to such an extent that it will be absolutely impossible, at our present rate of expenditure, to keep within our allowance. At present our monthly expenditures are as follows:

OFFICE EXPENSES.

Office rent	$90.00	
Clerk hire	180.00	
Stamps (about)	30.00	
Telephone	6.00	
President	25.00	
Secretary	291.66	
		$622.66

EXPENSE AT THE LABORATORY, FOR SALARIES, ETC.

Director	$125.00	
Assistants	168.00	
Telephone	6.00	
		299.00

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MISCELLANEOUS.

Stenographer	$25.00	
Live stock inspector (New Brighton)	54.00	
		79.00
Total		$1,000.66

This means an annual expenditure of $12,007.92, leaving from our total fund of $12,500 but $492.08 for supplies, traveling expenses, etc., a sum that is entirely below our needs.

Our present financial condition is not good. To meet the expenses of April, May, June and July of 1897, we have on hand:

State board of health fund (balance)	$732.41
Infectious diseases of animals fund (balance)	1,246.78
Vital statistics fund (balance)	319.98
Making a total for these four months of but	$2,299.17

Fortunately there is left over from last year's fund $3,231.44, which we should be able to draw upon to help us out of our trouble.

This condition of our finances is due to the expense of fitting up and equipping the laboratory, all of which expense (about $2,100) has so far been charged up to this year's appropriation.

It is a somewhat difficult matter to apportion the expenses of the laboratory between the two funds—the regular state board of health fund and the infectious diseases of animals fund. It is my opinion that in the first fitting out of this laboratory, which is for the investigation of infectious diseases of both animals and men, the expense should be equally divided, so long as the funds will permit of such, and that, with the present proportion of funds, the division in the support of the laboratory should be respectively three-fourths and one-fourth. If the board so considers this matter, the infectious diseases of animals fund would have, for its share of the laboratory expenses, to date, $1,643.95. As a matter of fact, but $316 has been paid for this purpose by this fund to date. In April I charged up to this account, $435.35, but the state auditor refused to honor this voucher, stating in reply that he was of the opinion "that the law does not warrant an expenditure of several hundred dollars for fitting up a laboratory out of this appropriation." I wish an opinion from the members of the board on this matter.

There has been a strong effort made to secure an extra appropriation for dealing with the infectious diseases among animals,

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and such effort has had the support of men representing stock interests throughout the state. Certain legislators, appreciating the importance of work along this line, have given us their hearty support. As a result of this united effort, a bill, making an extra annual appropriation of $3,000 has been passed by the legislature, and this will become a law, if signed by the governor. This amount will be entirely for field use. It is far short of our needs, and, realizing this fact, I have made an appeal to the secretary of agriculture at Washington to help us.

H. M. BRACKEN, M. D.,
Secretary and Executive Officer.

July 13, 1897.

The report for the last quarter's work of the board will be quite full, for it will include work done in the bacteriological laboratory, reported by Doctor Wesbrook, our bacteriologist, and also work done in connection with infectious diseases among domestic animals, reported by Dr. M. H. Reynolds, chairman of the committee on infectious diseases among animals.

My personal report will cover the work done through this office.

Quite an amount of printed matter has been edited through this office since our April meeting: The new laws relating to infectious diseases among domestic animals; the circular relating to hog cholera and swine plague, a reprint from the press bulletin, issued through the Minnesota Experimental Station by Dr. M. H. Reynolds, of our board; blanks for reporting infectious diseases among animals; records for cases of tuberculosis among cattle and for glanders. On these record sheets are given instructions for the use of tuberculin or mallein, as the case may be. There have also been issued hog cholera placards, and placards to be used by farmers to protect themselves against trespassers who might convey to their farms the germs of hog cholera. The work relating to infectious diseases among animals has been the combined work of your secretary and Dr. M. H. Reynolds. The direct use of these circulars and the benefit derived from them can best be described by Dr. Reynolds, in his report.

While on a trip to Blue Earth City I stopped for a short time at Mankato, and discussed with Dr. C. J. Curryer, assistant superintendent of the farmers' institute, the possibility of the state board of health reaching the farmers through the farmers' institute work.

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Dr. Reynolds, in his report, can tell you what has been done through this channel, for he has been personally engaged in the work.

After the passage of the new law relating to infectious diseases among animals, and the appropriation of an additional $3,000 for dealing with these diseases, it became necessary to secure a veterinarian to look after this work. Dr. S. D. Brimhall was engaged at first, as needed, but the demand for his services was so constant that in June he was permanently engaged at a salary of $1,800 per annum, as field veterinarian of the state board of health, subject to the approval of this board at this meeting. Dr. Brimhall works under directions from Dr. Reynolds, chairman of the committee on infectious diseases among domestic animals. Dr. Reynolds will tell you what this work consists of.

It may be well to state that I am kept closely in touch with Dr. Reynolds' work, as he sends me copies of all his letters, relating to state board of health work.

It is going to be a difficult matter to keep within our appropriations and carry on the work we have on hand. A saving of thirty-five dollars a month has been brought about in the matter of office rent. There will be a saving in small amounts along other lines. It is a question that must be settled to-day whether we can afford to continue employing a meat inspector at the New Brighton stockyards. This is good work, but it costs the board about $650 per annum. It was thought when this inspector was appointed that his services would be required for a short time only, as there would be federal inspectors appointed there soon, but as yet none have been appointed.

In June I attended the meeting of the American Medical Association, at Philadelphia. After this meeting had adjourned, in order to make myself more familiar with public health work, I visited the laboratories in Philadelphia, in New York, and in Chicago. I also visited the quarantine station in New York harbor and the isolation hospital in Chicago. My trip was highly instructive in many ways.

Since our last meeting in April I have made several trips in connection with the work of the state board of health, and on these I will report.

In May I was requested to visit Blue Earth City and inspect the stockyards belonging to the Chicago, St. Paul, Minneapolis & Omaha Railroad. The city had under consideration the matter of ordering these yards removed outside of its limits. The point was made that

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they were in a filthy state, and were a public nuisance. At the time of my visit, May 13th, the yards did contain a large quantity of manure, but this was because the railroad company had been delaying action in cleaning up to see what the city was going to do. Manure does accumulate in these pens during the winter. It cannot well be cleaned out during the cold season, but it should be cleaned out as early as possible in the spring, and this the company seemed willing to do.

In considering this stockyards question, three parties have to be kept in mind. First, the citizens of the town complaining; second, the railroads; third, the shippers.

It is in the interests of any railroad town to have these shipping yards. They bring business to the place. That business men appreciate this fact is illustrated by the action of the business men of Blue Earth City, who promptly circulated a petition against the action of the town council in the matter of compelling the railroad to remove its pens.

It is in the interests of the railroad to have these shipping pens, for the life of the railroad depends upon its freight. Of course, if stock is raised, it will be shipped; if not from one point, it will go from some other place.

Recognizing these facts, the question arises, why is there trouble between these shipping towns and the railroad? If the fault lies with the railroad, as it sometimes does, the railroad should see to it that the cause of complaint is removed. From my observations thus far, I am inclined to think the railroads are willing to use all reasonable means to remove the objectionable features of their yards. There may be exceptions to this statement on some railroads in towns where there is no competition. The chief source of trouble rests often with the shippers. These shipping pens are intended only for holding stock for shipping; not for continuous feeding. I believe it is a common rule of railroads that stock should not be kept in these pens over twenty-four hours. In many places this rule is constantly broken by shippers, who use these pens for collecting and feeding stock in. As a result, the pens are seldom empty, and the accumulation of manure is bound to become a public nuisance. The railroad, in many cases, cannot enforce the twenty-four hour rule, because of competition. It therefore becomes the duty of the local board of health to see that the nuisance is abated, and in doing so the board should be careful to deal fairly with all parties. If the railroad has furnished good shipping pens, and is disposed to keep such pens clean, the shippers should be compelled to do their

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duty, both to the railroad and to the town. The twenty-four hour regulation should be insisted upon. It seems to me not an unjust requirement that the shippers should be compelled to keep the pens clean. I have found some places where they were willing to do so. If our neighbor should give us the free use of his stable, we would not expect to allow a nuisance to exist about such a stable through our negligence. The shippers are in very much the same position. They have the free use of these pens, and it would not be an unfair division of responsibility that they should be required by the railroad authorities to keep these premises clean. I am aware that the enforcement of the twenty-four hour regulation would be somewhat of a hardship for the shippers, but is it not a possible solution of this difficulty.

No feeding ground for stock can be maintained for any length of time in any town without becoming a public nuisance, and no railroad should be compelled, for the accommodation of shippers, to maintain such feeding grounds. Shipping yards should be used only for their legitimate purposes.

I have gone thus fully into this question because it is one of the trying questions at the present time. Only last week, while on a short trip, I visited two towns where there was trouble with these shipping yards. In one place an injunction had been served upon the railroad authorities to compel them to remove their pens. In one case the railroad was undoubtedly at fault in supplying very poor pens.

On my desk at the present time is an inquiry as to how a town officer shall act in reply to a petition, with thirty-five signers, requesting that the stockyards in a certain village be declared a public nuisance, and asking that the railroad be compelled to remove them.

Another common source of trouble in towns and villages is the creamery, the wastings of which give rise to a most intolerable stench. If the board can give any suggestions in connection with this nuisance they will be appreciated by your secretary. So far I have seen but one satisfactory means of disposing of such waste, viz., collection in a water-tight tank and removal from this tank to some point where it cannot become a nuisance. This, of course, applies only to creameries located in a town with no sewerage connection.

Another source of complaint is the public "dump." This should be easily controlled. It is not an uncommon custom to think that a "dump" is for everything that is to be thrown away. This is a mis-

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take. The carcasses of animals should never be thrown upon the dump. They should be buried or burned. Manure should be kept by itself, and even the different grades of manure should be kept separate. That which is suitable for fertilizing purposes ought naturally to be cared for by the farmer. Ashes should not be thrown on a dump with garbage. Ashes are not offensive in any way, and can be put to some use.

A dump should not be near habitation or public road, for it quickly becomes a most intolerable nuisance.

In connection with my duties I have visited, since our last meeting, Blue Earth City, Winnebago City, Fairmont, Jackson, Austin, Blooming Prairie, Dodge Center, and Owatonna. To some of these places I have gone by request. Others I have visited simply because I was near to them, and wished to make myself familiar with conditions as relating to public health in their neighborhood.

I wish to bring before this board, for its consideration, the best means of dealing with measles. It is my opinion that strict quarantine with this disease does more harm than good, for it tends to increase rather than decrease the spread of the disease. Not only is the tendency, through too strict quarantine, to increase the disease, but also to increase the mortality. Measles is a more serious affection than is generally recognized by the laity. It should be under the care of a physician from start to finish. It may need little attention. A little good medical advice may be all that is called for. If strict quarantine is enforced, this will not be secured, for the laity, not recognizing the serious consequences, through bronchitis, etc., as belonging to measles, look upon it as a harmless disease, and avoid the doctor in order to avoid quarantine. Again, the early stage of possible infection makes it almost impossible to control, by any quarantine regulations, the spread of this disease. Still further, this is a disease that we are all pretty certain to have, sooner or later, and it seems to me it had better come sooner than later. Surely the child at home has every advantage when sick with measles over the adult suffering from the same disease.

My ideas are, that a house in which measles exists should be simply placarded, in order to warn away such as may wish to avoid the disease. No restrictions should be placed on those going to and from the house, for the disease is not readily transmitted in this way, but a careful watch should be kept on members of the household already infected, for the first appearance of the early symptoms of this disease, and on the first appearance of such symptoms the infected ones should be confined to the house. It may be well

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to keep children belonging to an infected family away from school, but even this is questionable. Your secretary will be glad to learn whether this position meets with the approval of the board.

It seems to me that this board should have some way of helping the health officers throughout the state. There should be some publication issued,—at no fixed date, but as material may arise. I would suggest that this matter be left to the discretion of your secretary, if it meets with your approval. The only objection that I can see is that of expense, and I think you can trust me in dealing with such questions. I am sure the health officers throughout the state will appreciate our efforts to keep before them the latest and best views on protective medicine.

Still further, it is but right that some means should be taken for the preservation of papers written by members of this board. I would suggest that we choose some size of page, and in securing reprints of our articles, request the publishers to give us such size page. These papers can be used for the purpose: (1) Of giving to health officers throughout the state the benefit of views of members of this board on sanitary matters; (2) of demonstrating the fact that the board is an active, thinking, working board.

For a uniform size of page for reprints, I would suggest that used at present by the New York Medical Journal. I think that it would be wise to give a place in our biennial report to all papers published by members of this board having a bearing on preventive medicine.

H. M. BRACKEN, M. D.,
Secretary and Executive Officer.

Oct. 12, 1897.

The reports for this quarterly meeting of the board comprise those of your secretary, on the work of the office, of Dr. Reynolds, on the work of the veterinary department, and of Dr. Wesbrook, on the work of the bacteriological laboratory. Dr. Wesbrook's report is an unusually interesting one, for in it is included two valuable papers representing the work of the bacteriological laboratory, in connection with diphtheria and typhoid fever. This laboratory has been fortunate (or unfortunate) in its opportunities along these lines. The endemic character of diphtheria at one of our public institutions, in spite of the extreme care of those in charge, has presented an interesting study to the bacteriologist and to the clinician.

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The prevalence of typhoid fever in one of our large cities and the demands upon the state laboratory, because of the lack of any municipal facilities, has given an opportunity that falls to the lot of but few boards of health for watching the practical application of a new bacteriological method. Our laboratory was among the first to adopt the Widal-Wyatt Johnson method for the diagnosis of typhoid fever, and has made about one-third the total number of serum examinations for typhoid fever reported in the United States during the past year. That such opportunities have been of benefit to the public, as well as to the physician, it is needless to say.

Dr. Reynolds' report is very complete, as relating to the work of the veterinary department of the board, in dealing with the infectious diseases of animals. This is an herculean task. The more appreciation should be shown for Dr. Reynolds' work when we bear in mind that it has largely been done without compensation. It seems but right that this board should determine upon some amount, be it ever so small, as a fixed payment for these services. That something has been gained by the work through this department is beyond question. That more might have been accomplished had the local health officers had a broader knowledge of their duties is an undoubted fact. The work is new, and the law under which the work is being done is new. There is much to be done to bring about a more general understanding of the conditions before us, as relating to these diseases, and how we are to meet them.

The idea of having a copy of each report, to be presented at this meeting, sent to each member of the board, previous to the meeting, in order that all might be familiar with the matters that would come up for discussion, came at too late a date to have the work done in as good form as we would wish for. Of course, the object is to save the time that would naturally be given to the reading of these reports for their discussion. In this way we should accomplish much more than after the old method at our short quarterly session. If this idea meets with your approval, we will try to make it more complete for our next meeting.

Since our meeting in July, I have made the following trips:

On July 14th I went to Dawson. The local health officer had quarantined a family because of scarlet fever in the house. A local physician had made trouble by saying the case was not scarlet fever. The father of the family had broken quarantine, had been arrested and fined. The local health officer, Dr. M. N. Triplett, was in the right. The patient was desquamating when I saw her. Quite a number of cases of scarlet fever can be traced to this one case as the source of infection.

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In August I attended the meeting of the National Conference of the State Boards of Health at Nashville, Tenn. Dr. Smelzer not being present, your secretary presented the first topic: "Should the Tuberculous Insane be Isolated from the Other Inmates in Our Asylums and Accommodations be Provided for Them in Separate and Detached Buildings?" The discussion was quite one-sided, all being in favor of the isolation of the tuberculous insane. The following resolution was presented by Dr. Fomento of Louisiana, and adopted:

Resolved, That it is the sense of this conference that tuberculous patients should be isolated from other inmates in our hospitals, asylums, prisons and penitentiaries.

Shall we take any action on this resolution, as applying to our own state?

The question as to whether the county jails and prisons of the different states should be placed under the sanitary supervision of their respective state boards of health was presented by Dr. McMurray of Tennessee. I am inclined to the belief that our local boards are responsible for inspection of such places in this state. I feel that, with the local inspection and the supervision that the state board of corrections and charities has over these places, our state should be well cared for. It will not do, however, for this board to shift all the responsibilities of such institutions upon the shoulders of others.

In the discussion relating to the question of feeding the offal from slaughter-houses to hogs, the danger from trichinosis was pointed out; also, the inferior quality of the meat of hogs fed at such a place. Dr. Lee (Philadelphia) stated that the law in Pennsylvania forbids the establishment of piggeries at slaughter-houses, where the intent is to feed offal. As I understand it, these piggeries are controlled in this state under the head of a nuisance. I am under the impression, however, that this board has power, under our new law, to adopt a rule that will have a direct bearing upon the prevention of this dangerous practice.

Dr. Swartz (R. I.) made a very excellent report on the condition of vaccine establishments throughout the United States.

The question of transportation of the dead was well presented. This subject was thoroughly discussed at a joint conference of representatives of state and provincial boards of health, funeral directors and general baggage agents, which convened at Cleveland, Ohio, June 9, 1897. This conference was suggested by a committee of the

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American association of general baggage agents. Rules were drawn up, to be presented to the national conference of state boards of health, and their adoption was urged. These rules were acted upon, and, with slight modification, adopted at the meeting of the board April 12, 1898. (See Appendix I.)

On August 22d I was called to Buffalo Lake to settle the question as to the existence or nonexistence of diphtheria. The trouble had resulted from a resident physician stating that certain existing cases of sore throat were not diphtheria, while other physicians had given the reverse opinion. I pointed out to those in authority the needlessness of wasting time over such a discussion when a bacteriological examination would quickly show which party was in the right. Those ill were quarantined at once, and in each case the usual examination at our laboratory confirmed the clinical diagnosis of diphtheria.

On August 28th I went to Rochester, at the request of the county attorney, to investigate the question of sewage disposal at the county farm. The health officer at Rochester had objected to the placing of a cesspool near the stream that supplies Rochester with drinking water. Dr. W. J. Mayo of our board, Dr. Adams, the health officer at Rochester, and myself met with the county officials at the county farm, and after consultation, decided that Dr. Adams was undoubtedly right in the position he had taken. The county commissioners were requested to carry the sewage from the poorhouse to a point where all danger of polluting the stream referred to would be removed. I presume Dr. Mayo can tell us what has been done.

On September 4th I went to St. Peter, because of a complaint from a farmer that proper steps were not being taken to prevent the spread of hog cholera. Through the kindness of Dr. McIntyre, I met the board of supervisors of Traverse township, and pointed out to them the necessity of rigid quarantine in dealing with hog cholera. The complaint was to the effect that a certain man who claimed that he could cure hog cholera was bringing sick hogs into the township with the intention of curing them and putting them on the market. I drew the attention of the board of supervisors to the fact that this could not be allowed, ordered the quarantine of these hogs for a period of two weeks, to watch for the possible appearance of any hog cholera among them.

On September 11th I went to Adrian, and met about thirty members of the boards of supervisors, etc., in the town hall, where I talked with them as to their duties in dealing with matters pertaining to state board of health work, and especially in taking steps at

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the present time to prevent the spread of hog cholera. I made trips for a similar purpose on September 18th to Willmar, on September 25th to Redwood Falls, on October 2d to Granite Falls, and on October 9th to St. Charles, in each instance meeting quite a number of men. I think these meetings have been of value. It is surprising to find the ignorance and indifference displayed in dealing with the disease that at present is doing so much to injure a great industry in this state. I mean hog cholera. Not only are the farmers in many instances doing the very things that tend to spread the disease, but in some instances those in authority seem quite as much at fault. This is not always the case. There are some good men who are doing good work, and I think many who now take little interest in the work of caring for infectious diseases of animals will take hold of the matter in earnest when they understand their responsibilities. It is to impress upon them these responsibilities that I have gone out so often to meet officials in different parts of the state.

On July 20th the committee on infectious diseases of animals met at this office to devise some means to prevent the spread of hog cholera. By request, certain representatives of the railroads were present; also, representatives of the stock interests of the state. Dr. Reynolds will report more fully on this matter, I presume.

On August 5th the committee on infectious diseases of animals met at this office with representatives of the St. Paul and Minneapolis city boards of health, to consider the question of preventing the sale of meat from carcasses of animals that had been ill with tuberculosis, lumpy jaw, etc. All parties felt that something should be done, and that the state board and city boards should work together to bring about some improvement in this line. There is no question but what unscrupulous parties in this state are killing animals and disposing of meat that is unfit for food. This subject should receive the attention of this board to-day. A proper solution of this difficulty would be the establishing in all cities or villages of any considerable size of abattoirs that would be under the control of the proper sanitary authorities. All meat could then be carefully inspected before it was placed upon the market. I believe such a plan is practical, and in every way to be commended. Such public abattoir could and should be self-supporting. By this I mean that the matter of inspection, etc., need not be a charge upon the town in which it might be located.

There is a great difference shown by the railroads in their appreciation of the work we have undertaken looking to the control of

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infectious diseases of animals. Some, recognizing their own interests in the success of the farmer, join with us heartily in trying to meet each outbreak. They are very willing to give the necessary transportation in order that the proper representative from this board, be he executive officer, veterinarian or bacteriologist, may take action promptly. Other roads give passes grudgingly, and are disposed to try to dictate as to who is the proper man to be sent out from the board on special work, while other roads refuse flat-footedly to give any assistance in the way of transportation to this board. Of course it follows that this board, with its limited means, cannot do so much volunteer work over a district where it has to pay transportation as along railroads where transportation for this necessary work is furnished free. It would seem that railroads should appreciate the fact that their own interests are involved and that they would willingly give us all the help possible.

At our last quarterly meeting your secretary suggested that this board should consider the question of issuing a bulletin, in order that the health officers throughout the state might be brought in closer relationship with the state board of health, and also with each other. Inquiry as to the expense connected with such publication develops the fact that at present we cannot afford to follow up this suggestion, although there is much need for such a bulletin.

It has seemed to your secretary that, with the knowledge we now have of antitoxine as a therapeutic agent in the treatment of diphtheria, it was almost criminal to permit a patient to die from this disease without having had the benefit of antitoxine. Realizing the difficulty that physicians in the country sometimes have in securing this product, it was decided by your executive committee that it would be wise to send out circulars bearing upon the use of antitoxine. I hope this action will meet with the approval of the board.

Reports from the yellow fever district are still coming in. On September 28th, your secretary wrote to the secretary of the state board of health of Louisiana, expressing sympathy for the state in its misfortune, and suggesting that we, as a board, were willing and anxious to be of service, if possible. An acknowledgment of this offer was received from Dr. Patton, expressing his appreciation.

Your secretary has thought it wise to make such an arrangement with a clipping bureau that all matters relating to public health appearing in papers throughout the state shall be sent to this office. Much benefit has already been derived from this arrangement, for it has been the means of bringing to our knowledge, for the first

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time, the existence of infectious disease, thus enabling us to get in touch with the local authorities, who, in many instances, it seems, do not understand their relation to the state board of health.

Matters pertaining to the work of the bacteriological laboratory and to the veterinary department will be reported to you by Drs. Wesbrook and Reynolds respectively.

H. M. BRACKEN, M. D.,
Secretary and Executive Officer.

Jan. 11, 1898.

In reviewing the work of the board for the past year the question naturally arises, What has been accomplished? It seems to me a great deal.

The veterinary department has been created, and has a thorough understanding of the veterinary work before us, as shown by the reports of Dr. Reynolds. The work connected with infectious diseases of animals has been very satisfactory from the executive point of view, except so far as relates to the control of hog cholera. Here the board has had much to contend with.

(1) Ignorance of the law on the part of health officers and acting health officers. The work is new to many of them.

(2) Indifference of acting health officers as to the enforcement of the law.

(3) Ignorance and indifference to the dangers from the disease on the part of swine owners and shippers.

(4) The false teachings of hog doctors and medicine men.

It is quite evident that in order to control this disease prompt action must be taken at the first appearance of an outbreak in any community. There must be thorough quarantine and the use of every possible means known to prevent the spread of infection. The fact that the disease is infectious must be impressed upon all parties concerned in hog raising.

The bacteriological laboratory has been worked to its utmost capacity, as shown by Dr. Wesbrook's reports.

Your secretary is constantly called upon to advise as to the best antitoxine, the best vaccine virus, the best disinfectants, etc. Conditions should be such that the laboratory might make systematic and frequent reports on these topics, in order that your board might be able to give intelligent answers. It is a poor policy to make recommendations where one's knowledge is imperfect.

So far our laboratory has been very fully engaged in the routine work of microscopical diagnosis, to the disadvantage of the other

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lines along which it has been engaged. A great part of this routine work has been for the city of Minneapolis, and this without any financial assistance from the city. This is not right. Minneapolis should bear the expense of her own laboratory work. The state, with its well equipped laboratory, can undoubtedly do the bacteriological work for Minneapolis much cheaper than the same quality of work can be done in a properly equipped city laboratory. It seems to me necessary for Minneapolis to take action at an early date as to what her policy shall be in the future.

The reports for this quarterly meeting of the board comprise, as usual, those from your secretary on the executive work, from Dr. Wesbrook on the work of the bacteriological laboratory, and from Dr. Reynolds on the work of the veterinary department.

Following out the instructions of the board at its last meeting, relative to the isolation of tuberculous inmates in state institutions, your secretary sent out the following questions:

First—Is any effort made to isolate the tuberculous under your care?

Second—What percentage of those under your care are tuberculous?

Third—Is tuberculosis increasing any in your institution?

For the state prison, Dr. Merrill reported that the isolation of tuberculous convicts was introduced there four years ago. In connection with this isolation, a complete examination of every convict, at the time of his arrival at the prison, is made, for any symptoms of tuberculous trouble. There is a row of cells known as "Tubercular Row," to which are assigned the tuberculous convicts. In this row each cell is provided with a cuspidor containing a disinfecting fluid, which is renewed daily. Extra precautions are taken in disinfecting the floors and walls of the cells. The night buckets are disinfected daily. Care is also taken in the food of these prisoners. As a result of such action, there has been a decrease in the number of cases of tuberculosis. Dr. Merrill reports six well-defined cases of tuberculosis now in the prison.

The reports from the institute for defectives is quite remarkable. It is as follows:

In the school for the deaf and dumb, no deaths during the first thirty years of its existence (up to 1895). Two deaths since 1895, one of which was from scarlet fever. No deaths from tuberculosis.

The school for the blind had no deaths during the first twenty-eight years of its existence (up to 1895). In 1895 there was one death from pneumonia and one death from tuberculosis.

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Dr. Rogers reports that, in the school for feeble-minded, there were 198 deaths in sixteen years (1881-1897). Of these, forty-five were due to tuberculosis. Particular pains are taken to examine all newcomers for tuberculosis. Children suffering from incipient tuberculosis are housed in one of the detached buildings of the institution that is provided "with wide porches and airing courts," where they can spend much of their time. Absolute isolation is not followed, and is hardly necessary, for with children the sputum is generally swallowed, and this childish habit, though not to be commended, is an actual safeguard against the general dissemination of the tubercle bacilli. Nov. 17, 1897, there were four tuberculous inmates, three males and one female. Of these, one male was improving, two males and the female declining. The death rate from tuberculosis, from the opening of the institution, has been about five per cent. It is recognized that there are many other cases in which tuberculous conditions are present. In institutions of this kind it is generally understood that from forty to fifty per cent of the children are tuberculous. In this institution those suffering from tuberculosis are separated from the nontuberculous during the nights.

Dr. Jaehnig reports from the state training school: "No well-marked cases of tuberculosis." Tuberculosis is not on the increase. There is no need for isolation.

Dr. Greenlee reports from the soldiers' home, that, so far as possible, the tuberculous in the hospital have been isolated; that great care has been taken in disinfecting the sputa; that it is not possible to house the tuberculous in a separate and detached building. There is no evidence thus far of the disease having spread from such lack of isolation. The following table is taken from Dr. Greenlee's report:

TUBERCULOSIS.

	Inmates.	Tuberculosis.	
		Cases.	Deaths.
Year ending June 30, 1893	142	1	1
Year ending June 30, 1899	306	12	7
Year ending June 30, 1904	408	13	4
Year ending June 30, 1895	508	6	3
Year ending June 30, 1896	551	7	2
Year ending June 30, 1897	556	7	4

From the Minnesota state reformatory comes the report that the changing population makes it impossible to give any accurate statistics. There has been, however, but little sickness at this institution. There are no well-developed cases of tuberculosis among the 160 inmates.

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From the state school at Owatonna comes the report that it is not a "custodian institution," hence there is no accumulation of tuberculous cases.

Little can be drawn from the reports from the three hospitals for the insane. At Fergus Falls it seems possible to isolate. At both St. Peter and Rochester complaint is made of too great crowding of the patients to permit of isolation. The following table taken from the vital statistics reports since 1888 shows a gradual increase in the mortality from tuberculosis in at least two of these hospitals:

Institutions.	Total Deaths for the Years of							
	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Rochester hospital	48	47	68	86	77	103	73	66
St. Peter hospital	54	44	62	58	62	45	38	61
Fergus Falls hospital	.....	3	8	12	19	48	41	26
Feeble-minded hospital	7	3	9	12	9	17	21	19
State prison hospital	4	3	2	1	1	3	5	1

Institutions.	Deaths from Tuberculosis in the Years of							
	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Rochester hospital	7	8	15	11	19	27	18	21
St. Peter hospital	8	8	10	4	10	8	11	9
Fergus Falls hospital	.....	.....	.....	.....	1	5	5	8
Feeble-minded hospital	2	.....	1	5	4	3	2	2
State prison hospital	2	1	1	.....	.....	2	4	.....

The school for feeble-minded shows a gradual improvement.

The state prison shows an improvement for a time, with a sudden increase of percentage. This increase is attributed to the importation of national convicts from the South in the year of 1893. The number of deaths from tuberculosis in this institution is again on the decline.

Judging from all of these reports, it is interesting to note that those in authority appreciate the importance of special care for the tuberculous, as for any other infectious disease; that where isolation is not practiced, it is because of the unvoidable crowding in the institutions; that those in charge of these over-crowded institutions appreciate the disadvantages under which they are laboring.

In relation to "piggeries" at slaughter houses where the intent is to feed offal, it was suggested at a meeting of your executive committee, held Oct. 16, 1897, that the board put into force, at some fixed date in the future, a rule prohibiting the feeding of offal from slaughter houses to hogs. The following was given as perhaps suitable in form for such a rule:

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State Board of Health, St. Paul, Minn.

After April 1, 1898, no hogs shall be permitted to be kept or fed at or about slaughter houses; nor shall the offal from slaughter houses be fed to hogs. These rules are established:

1. To prevent the transmission of certain infectious diseases to mankind.

2. To prevent the spread of certain infectious diseases among animals.

3. To avoid the creation of a public nuisance.

The state board of health has been unfortunate in an action taken against glandered horses belonging to Mr. Geo. C. Griggs of Camp Release township, near Montevideo, Minn. The horses were tested in October by Dr. Lambrecht of Montevideo. The owner was not satisfied with the result of the test, which pointed clearly to glanders. A second test was made, this time by Dr. Brimhall. The reaction was not pronounced, but still was enough to condemn the animals. The owner was still determined to prevent the killing of these two animals. On November 4th I went to Montevideo, met Dr. Brimhall, and proceeded to kill the horses according to law. A board of appraisers was appointed. These fixed the value of the animals at ninety and eighty-five dollars. The board of experts had been appointed before my arrival. It consisted of Dr. S. D. Brimhall for the state and town, Dr. R. M. Dodds of Mankato for the owner, Dr. T. G. Risum of Montevideo as the third member. Dr. Risum should not have been appointed on this board, for he was, to a certain extent, an interested party. He was a resident of the same town as the veterinarian who made the first test condemning the animals, and the relations between the two veterinarians were not friendly. The animals were killed and a post mortem held. Lesions were apparent, which Dr. Brimhall considered those of glanders, but which were not so considered by the other two experts. The result of the vote of the experts after the post mortems were over was two against glanders and one (Dr. Brimhall) for glanders. This vote of the board of experts made it necessary for the town and state to pay their respective proportions (one-fifth and four-fifths) of the appraised value of these two horses. I think it is beyond question that the post mortem of these two horses bore out the mallein test, and this is my opinion in spite of the verdict of the two experts who voted against glanders.

As instructed by this board at its last meeting, Dr. Wesbrook and myself attended the meeting of the American Public Health Association at Philadelphia, October 26th to 29th.

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Dr. Wesbrook presented two papers, one on typhoid fever and one on rabies. Your secretary presented one paper on typhoid infection. The session was a very busy one. Among the many interesting papers were those on yellow fever, diphtheria, tuberculosis, bovine tuberculosis, as bearing upon our milk and meat supply, pure water supplies, etc.

Of committee reports, those of special interest related to:

1. Drainage, Plumbing and Ventilation of Public and Private Buildings.
2. Pollution of Water Supplies.
3. Disinfectants.
4. Animal diseases and Animal Foods.
5. Disposal of Garbage and Refuse.
6. Nomenclature of Disease.
7. Health Legislation.
8. Transportation and Disposal of the Dead.

While the association was well entertained by the Philadelphians, little time was wasted in pleasure. A trip was arranged for October 30th, to permit of those members who could stay over to visit the quarantine stations on the river below Philadelphia. Neither Dr. Wesbrook or myself found it convenient to stay.

The following trips have been made by your secretary during the last quarter: (1) To New Ulm, November 14th, in order to get a general idea of the sanitary condition of the city. Typhoid fever has been prevailing to some extent in this place. There is little excuse for this condition of things, for New Ulm has a good, and probably safe, water supply. It is without any sewerage system, however, and those infected with typhoid fever had been using well water.

(2) November 21st—Visited Shakopee. Found hog cholera about six miles out of town, in Marysville township. Advised the parties what to do, and gave such information as I had gained, as to where hog cholera was prevalent, to Dr. Reynolds, in order that he might give the proper officials information and instruction required.

(3) November 27th—Visited Mantorville, at the request of Dr. Van Cleve, the health officer, to talk over the subject of hog cholera in a general way. Met some of the neighboring chairmen of the boards of health and stockmen.

A report upon lumpy-jaw cattle having come to me indirectly, I sent the following instructions to the chairman of the board of supervisors where the offending party lives:

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"My Dear Sir: I am told that a certain man by the name of Schmead (or Schmidt) is making a business of keeping lumpy-jaw cattle. This cannot be permitted. This disease is an infectious one, and must be dealt with as are other infectious diseases. Please make a note of all the cattle on this man's place, taking such a description of each one as to enable you to identify each and every one should any attempt be made to sell them clandestinely. It would be well for your board of supervisors to do this as a body. Note how many of the cattle have signs of lumpy jaw. Do not permit the sale of any of the lumpy-jaw cattle except for slaughter, *under inspection.* Proper inspection can be made of such stock at packing-houses where there are government inspectors, or should the owner wish to kill at home, we can send an inspector, at his expense, who may pass upon the suitability of animals for slaughter. The carcasses of all condemned animals must be so treated as to render their sale for food an impossibility. This is generally accomplished by pouring kerosene over the carcasses.

"Please note carefully section 1 of inclosed law."

(4) By request I visited Shakopee December 6th, the date of the regular quarterly meeting of the stock fair at this place. There were about 200 people present to learn something about hog cholera.

(5) By request I was also at the Mankato meeting of the Minnesota Valley Medical Association, December 7th, and presented a paper entitled, "The Relationship between Infectious Diseases of Animals and of Men." It was pleasing to note the interest taken in the discussion of this paper.

From my experience derived from contact with various chairmen of the boards of supervisors when on trips through the state, it seemed advisable to issue certain circulars of information. This can safely be left to the executive committee, I presume.

In the matter of establishing a bulletin for the board, I have to report that such a journal can probably be issued monthly or quarterly without expense to the board, should you see fit to put such power into the hands of your secretary. Of course, the editing of such a journal would rest upon your secretary.

The laws of the state relating to sanitation refer to rules and regulations of the state board of health and of local boards of health. At present the state board of health has no rules beyond those drawn up in August, 1897, as relating to hog cholera. I would advise that the executive committee be instructed to take this matter up for consideration at once, with power to act.

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In many states it is the custom for the various boards of health throughout the state to hold meetings for the discussion of sanitary questions. I would suggest that such a meeting should be arranged for in this state at an early date, and that some fixed custom should be established for the future. This question can well be left with the executive committee, with power to act, or to report back to the board, as you may decide.

Since we have been receiving the newspaper clippings I have found that not all the quarantinable diseases are reported to the state board of health. Such report is necessary if our morbidity tables are to be of any value. The "clippings" have enabled us to get knowledge of many outbreaks of diphtheria, scarlet fever, measles, etc. Recognizing the fact of imperfect returns, I thought it well to send to medical men throughout the state a blank, asking them to kindly fill it out. There has been quite a general and willing response to this request, as shown by the returns. Various suggestions have come to me as bearing upon this work for the future.

The following table has been compiled from these returns:

CASES OF INFECTIOUS DISEASE REPORTED IN CORRESPONDENCE OF HEALTH OFFICERS, CHAIRMEN AND CLERKS, FROM FEB. 1 TO DEC. 31, 1897.

Disease.	Cases.	Deaths.	Different Localities.	Different Counties.
Diphtheria	909	146	127	49
Scarlatina	341	16	88	24
Typhoid	1,405	123	18	17
Smallpox	6	.....	1	1
Leprosy	4	3	4	4

On this blank I asked for returns of typhoid fever, tuberculosis, leprosy and membraneous croup, in addition to the recognized quarantinable diseases. This was with the object of encouraging more thoughtfulness in the care of these recognized infectious diseases not yet quarantinable in our state. It may be well to draw attention to the fact that so-called membraneous croup should be quarantined until the laboratory has established, beyond a doubt, that the disease is *not diphtheria*. I am sorry to say that observation leads to the conclusion that some physicians, and occasionally a health officer, will call a very suspicious case of "sore throat" membraneous croup, rather than diphtheria, in order to shield the household from quarantine. It must be a very selfish individual who will ask that such leniency be shown him, and it must be a very obtuse neighborhood that will tolerate such illegal and outrageous proceedings. It is a fact, and an unfortunate fact, that there are still some physicians who sneer at the laboratory diagnosis of diph-

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theria. We can but pity them. They are too much behind the times to improve, I presume.

Our meat inspector at New Brighton, Mr. Pomplun, has done good work, and shown himself worthy of confidence. His report is appended. When an inspector was appointed for New Brighton it was supposed that this board would soon be relieved of such responsibility, through the appointment of a national inspector. More than a year has passed since such appointment was made, and still there has been no such inspector appointed, nor does there seem to be any prospect of such an appointmnt. There is no more reason why we should maintain an inspector at this point than at other killing points within the state, and yet, with no national meat inspector stationed there, it is difficult, if not impossible, for us to do away with our inspection at the present time.

WORK OF LIVE STOCK INSPECTOR AT NEW BRIGHTON, FROM FEB. 22 TO DEC. 31, 1897, INCLUSIVE.

	Received.	Shipped.	Sold for Slaughter.	Killed.	Sold as Stockers.	Quarantined	Condemned
Cattle	83,740	74,808	6,009	6,768	13,448	4	14
Hogs	61,808	20,064	59,088	39 821	2,120	1	3
Sheep	336,098	207,336	8,629	8,482	14,250	.....	35
Calves	307	155	147	133	.....	.....	.....
Total	480,748	302,348	74,873	55,204	29,818	5	52

In regard to municipal meat inspection and abattoirs to be placed under municipal control, nothing has yet been definitely settled upon as a policy to be recommended. It certainly is a fact that is quite generally recognized that there should be careful inspection, both ante and post mortem. In connection with the inspection of dairy cattle, as carried on by the city board of health of Minneapolis, it seems advisable that an authorized inspector from our board should keep such cattle as are condemned by the tuberculin test under observation until they are finally disposed of. I understand that it would be quite agreeable to the Minneapolis board of health that we should give such authority to their meat inspector. I would, therefore, recommend that Charles Tilbury be given authority to act as meat inspector for the state board of health; this, without financial obligation on the part of the state board, and with power of cancellation at any time, at the discretion of the secretary and executive officer of the state board, by properly rendering notice to that effect to the commissioner of health of Minneapolis.

It may be well to state that very active measures are being taken in various parts of the country looking to the sanitary control of

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abattoirs and a more general inspection of all cattle to be used as food or for breeding purposes, and of cows for dairies. Pennsylvania has recently taken such legislative action that, after Jan. 1, 1898, all cows brought into the state for dairy or breeding purposes must be able to show a satisfactory bill of health or be quarantined on the border until they have been subjected to the tuberculin test.

No progress has been made in action relative to transportation of the dead. I have been waiting for some proposition from the embalmers, as relating to the preparation of bodies for transportation. The American Association of General Baggage Agents has this same question under consideration. Connected with their association is a committee consisting of Messrs. S. A. Smart, G. B. A. Great Northern R. R., W. H. Lowe, G. B. A. Northern Pacific R R., and E. F. Woode, G. B. A. C., St. P., M. & O. R. R., to whom such questions pertaining to the Northwest are referred. I have been asked to meet with them some early date to consider this important question.

It behooves us to be up and doing in order to keep our state in the front ranks in all matters pertaining to sanitation.

The system of reporting vital statistics remains unchanged from that of previous years. Returns are coming in more promptly and in better form. This is probably due to a more thorough understanding of the law relating to vital statistics.

As this is not the close of the fiscal year, it is hardly necessary to make a detailed financial statement. Suffice it to say that the funds at our control are not adequate to carry on the work we have undertaken.

H. M. BRACKEN,
Secretary and Executive Officer.

March 31, 1898.

The reports from the various divisions of the state board for this quarter contain many matters of importance for discussion, and I trust that much good work will grow out of this meeting.

Certain matters were referred to the executive committee of the board for action. These have been acted upon so far as possible.

You will remember that at our last quarterly meeting Dr. Mayo presented the following motion, which was carried: "That the proper authorities in Minneapolis be notified that, after March 1, 1898, the state board of health can no longer do the general labo-

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ratory work for Minneapolis unless said city pays its proper proportion of the expenses connected with such work." You will remember that this motion was the outgrowth of a statement from Dr. Wesbrook, as to the overworked condition of the present laboratory force and that the securing of financial aid from Minneapolis would enable us to employ another bacteriologist. Dr. Wesbrook and myself had an interview with the Minneapolis board of health regarding this matter. We were promised another interview with this board, but on February 8th, we learned for the first time, through the daily papers, that Minneapolis had appointed a bacteriologist to do the city work. Accordingly, the state laboratory discontinued serving this city February 9th, and Dr. Avery was requested to return all material in his possession belonging to the state laboratory.

The notice prohibiting, after March 1, 1898, the feeding of hogs at slaughter-houses, or upon the offal from slaughter-houses, has been printed in various papers throughout the state.

In order to bring the work of this board before the medical profession and the people in general throughout the state, it was decided to publish the reports presented at our last meeting in a revised form. Accordingly the report of the executive officer was published in the "Northwestern Lancet" for Feb. 1, 1898. The report of Dr. Wesbrook was published in the "Northwestern Lancet" for March 15, 1898, and the report of Dr. Reynolds is appearing in the "Journal of Comparative Medicine and Veterinary Archives."

At the February meeting of the executive committee it was deemed advisable to give Dr. A. McBride, government inspector at South St. Paul, authority to act for the state also, under the same conditions as granted Mr. Tilbury of Minneapolis at our last meeting. I trust the board will see fit to indorse this action.

The executive committee appointed at the last meeting of the board has held regular monthly meetings, and has taken the following action:

In connection with a plan to license embalmers for special work in preparing the bodies of those who have died of an infectious disease for transportation, the following rules, which have been submitted to representative embalmers for suggestions are now presented for your approval.

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RULES TO GOVERN THE PREPARATION OF THE REMAINS OF PERSONS WHO HAVE DIED OF AN INFECTIOUS DISEASE, FOR TRANSPORTATION.

I. It shall be the duty of every funeral director, undertaker or embalmer, who may wish to qualify as competent to prepare the remains of one who has died of an infectious or contagious disease, for transportation, to comply with the following requirements:

(1) He shall make application to the State Board of Health for a license. Such application shall contain his full name, age, place of residence, and the certificate of two legal physicians of good repute, as to his general standing.
(2) The application shall be accompanied by a fee of five dollars ($5.00), which shall entitle the applicant to examination as to his fitness for such special work.
(3) He must be able to pass such examination as shall be prescribed by the State Board of Health, in
    (a) Visceral anatomy of the human body.
    (b) The action and comparative value of germicides.
    (c) The methods of embalming.
    (d) The further precautions after embalming, to insure safety in the transportation of the bodies of those who have died of an infectious disease.
    (e) The meaning of infection and disinfection.
    (f) Bacteriology.
    (g) Such other topics as the board may, from time to time, see fit to name.

II. Such prescribed examinations shall be held, under the control of the State Board of Health, at such time and place as shall be designated by the board.

III. The State Board of Health shall judge as to the fitness of any applicant for such special license after he has completed his examination.

IV. The license contemplated in these regulations shall be limited to the term of one year, shall be signed by the president and secretary of the board, and shall have the seal of the board attached.

V. The license may be renewed annually by the payment of one dollar ($1.00) within thirty days after the expiration of the term of the license.

VI. All licenses shall expire December 31st of the year in which they are issued. The examination fee shall also cover the license for the fiscal year in which such examination is held.

VII. The State Board of Health shall have power to refuse the granting of a license, or revoke a license granted, at any time.

VIII. The secretary of the board shall keep a record in which shall be registered the names and residences of all persons to whom

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a license (as prescribed) has been granted, and the number and date of the license. A copy of this record shall be furnished to all those holding a license, and also to the various transportation companies within the state.

IX. The fees collected by the State Board of Health shall be used to defray the expenses connected with the holding of examinations, the publication of registers, and such other expenses as it may see fit to apply them to.

X. Punishment for non-compliance with the rules shall be in accordance with section 30, chapter 132, Minnesota Laws of 1883.

Your secretary and the committee representing the general baggage agents of the Northwest, have recognized the following rules, as suitable for use in this state in regulating the transportation of the dead. These rules were recommended and approved at the national conference of state boards of health, Nashville, Tenn., Aug. 19, 1897, and have been considered favorably by the General Baggage Agents' Association and by the National Funeral Directors' Association. They have already been adopted by a number of states, and it is the wish that they shall become general throughout the United States, Canada and Mexico. I trust they may meet with your approval.

Rule 7 is changed slightly from that adopted at the national conference of state boards of health. The original reads: "When dead bodies are shipped by express, the whole original transit permit shall be pasted upon the outside box, and the duplicate forwarded by the express agent to the secretary of the state or provincial board of health of the state or province from which said shipment was made." This did not seem to be sufficient; hence the substitute which appears in the rules submitted to you.

RULES TO GOVERN THE TRANSPORTATION OF DEAD BODIES.

Rule 1. The transportation of bodies dead of small-pox, Asiatic cholera, yellow fever, typhus fever or bubonic plague, is absolutely forbidden.

Rule 2. The bodies of those who have died of diphtheria (membraneous croup), scarlet fever (scarlatina, scarlet rash), glanders, anthrax or leprosy, shall not be accepted for transportation unless prepared for shipment by being thoroughly disinfected by (a) arterial and cavity injection with an approved disinfectant fluid, (b) disinfecting and stopping of all orifices with absorbent cotton, and (c) washing the body with the disinfectant, all of which must be done

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by an embalmer, holding a certificate as such, approved by the State Board of Health or other state health authority. After being disinfected as above, such body shall be enveloped in a layer of cotton not less than one inch thick, completely wrapped in a sheet and bandaged, and cased in an air-tight zinc, tin, copper or lead-lined coffin, or iron casket, all joints and seams hermetically sealed, and all inclosed in a strong, tight wooden box. Or, the body being prepared for shipment by disinfecting and wrapping as above, may be placed in a strong coffin or casket, and said coffin or casket incased in an air-tight zinc, copper or tin case, all joints and seams hermetically sealed, and all inclosed in a strong, outside wooden box.

Rule 3. The bodies of those dead of typhoid fever, puerperal fever, erysipelas, tuberculosis and measles, or other dangerous and communicable disease, other than those specified in Rules 1 and 2, may be received for transportation when prepared for shipment by filling cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton, and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a sheet and bandaged, and incased in an air-tight coffin or casket; provided, that this shall apply only to bodies which can reach their destination within forty-eight hours from time of death. In all other cases, such bodies shall be prepared for transportation in conformity with Rule 2. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate, as in Rule 2, the air-tight sealing may be dispensed with.

Rule 4. The bodies of those dead of diseases that are not contagious, infectious or communicable may be received for transportation when incased in a sound coffin or casket and inclosed in a strong, outside wooden box, provided they reach their destination within thirty hours from time of death. If the body cannot reach its destination within thirty hours from time of death, it must be prepared for shipment by filling cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a sheet and bandaged, and incased in an air-tight coffin or casket. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer, holding a certificate, as in Rule 2, the air-tight sealing may be dispensed with.

Rule 5. In cases of contagious, infectious or communicable diseases, the body must not be accompanied by person or articles which

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have been exposed to the infection of the disease, unless certified by the health officer as having been properly disinfected; and before selling passage tickets, agents shall carefully examine the transit permit and note the name of the passenger in charge, and of any others proposing to accompany the body, and see that all necessary precautions have been taken to prevent the spread of the disease. The transit permit in such cases shall specifically state who is authorized by the health authorities to accompany the remains. In all cases, where bodies are forwarded under Rule 2, notice must be sent by telegraph to health officer at destination, advising the date and train on which the body may be expected. This notice must be sent by or in the name of the health officer at the initial point, and is to enable the health officer at destination to take all necessary precautions at that point.

Rule 6. Every dead body must be accompanied by a person in charge, who must be provided with a passage ticket and also present a full first-class ticket marked "Corpse," for the transportation of the body, *and a transit permit showing physician's or coroner's certificate, health officer's permit for removal,* undertaker's certificate, name of deceased, date and hour of death, age, place of death, cause of death, and if of a contagious, infectious or communicable nature, the point to which the body is to be shipped, and if death is caused by any of the diseases specified in Rule No. 2, the names of those authorized by the health authorities to accompany the body. *The transit permit must be made in duplicate,* and the signatures of the physician or coroner, health officer and undertaker, must be on both the original and duplicate copies. The undertaker's certificate and paster of the original shall be detached from the transit permit and securely fastened on the coffin box. The physician's certificate and transit permit shall be handed to the passenger in charge of the corpse. The whole duplicate copy shall be sent to the official in charge of the baggage department of the initial line, and by him to the secretary of the state or provincial board of health of the state or province from which said shipment was made.

Rule 7. When dead bodies are shipped by express, the transit permit must be made in triplicate, and the signature of the physician or coroner, health officer and undertaker, must be on all three permits. Of these transit permits, one copy shall be pasted upon the outside of the box, one copy shall be forwarded by the express agent to the party to whom the body is shipped, and one copy shall be forwarded by the express agent to the secretary of the state or provincial board of health of the state or province from which said shipment was made.

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Rule 8. Every disinterred body, dead from any disease or cause, shall be treated as infectious or dangerous to the public health, and shall not be accepted for transportation unless said removal has been approved by the state or provincial health authorities having jurisdiction where such body is disinterred, and the consent of the health authorities of the locality to which the corpse is consigned has first been obtained. All such disinterred remains shall be inclosed in a hermetically sealed (soldered) zinc, tin or copper lined coffin or box. Bodies deposited in receiving vaults shall be treated and considered the same as buried bodies.

The state or local board of health shall satisfy itself that the remains of those who have died of an infectious or contagious disease are properly prepared for transportation, according to the above rules, before issuing a certificate for shipment.

Only such local boards of health as shall be designated by the State Board of Health shall have power to grant such certificates. A list of such local boards will be furnished to the railroad officials, embalmers, etc., upon request. Local boards of health that have power to grant permits for the transportation of those who have died of an infectious or contagious disease must keep a careful record of all such permits, and must send a copy of such record to the State Board of Health at the close of each year (December 31st).

Your executive committee has considered favorably the following rules, as applying to the work of the board, and ask your indorsement of the same.

RULES APPLYING TO THE EXECUTIVE WORK OF THE BOARD.

1. All rules drawn up as outlining the requirements of the board shall be submitted to the executive committee, and shall then be presented to the board at its next meeting for approval.

2. All agents of the state board of health, whether receiving pay or doing gratuitous work, must secure their appointment from the executive officer, the executive committee, or the board itself.

3. Appointments made by the executive officer or by the executive committee must be referred to the board at its next regular meeting for confirmation or rejection.

4. The head of a department shall have the privilege of making nominations for his department.

5. All agents in the employ of the state board doing field work, except when sent out from a department, must make reports to the executive officer, unless otherwise directed by the executive officer, executive committee or board.

6. All matters that are distinctly executive shall be referred to the executive officer.

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7. All reports coming to the executive officer of matters pertaining to the duties of a bacteriologist shall be referred to the director of the bacteriological laboratory. All matters pertaining to the duties of a veterinarian shall be referred to the director of the veterinary department. And so to any other departments of the board that may be created in the future.

8. In order to prevent the necessity of duplicating correspondence, executive work may be turned over to the heads of departments, at the discretion of the executive officer; but a copy of the letter received and a copy of the reply thereto shall be furnished the executive officer for filing in the office of the board.

9. Correspondence relating exclusively to departmental work shall be carried on directly between the local health officer and the director of that department.

10. The director of any department under the state board of health shall make prompt reports to the secretary of the board upon all questions of an executive character.

RULES CONCERNING WORK IN THE VETERINARY DEPARTMENT.

1. The director of the veterinary department shall have the privilege of proposing such circulars and rules as he may deem necessary for the purpose of defining the policy of the board with reference to the veterinary work of the board. Such circulars and rules shall be submitted to the executive committee or to the state board of health for approval.

2. The director shall conduct the correspondence dealing exclusively with veterinary matters. He shall have the necessary police authority to enable him to order quarantine, when in his judgment such course shall become necessary. He shall have authority to use his judgment in releasing quarantine in unusual cases, independent of the rules governing quarantine.

3. All agents and employes doing veterinary work in the field shall report to the director, and it shall be the duty of the director to furnish the secretary with such summaries of regular work and with such other information as the secretary may need, that he may keep fully informed concerning the work.

4. It shall be the duty of the director to refer such matters as violation of the law dealing with infectious diseases of animals, general enforcement of said law, and indifference and carelessness of local health officers, to the secretary for action.

5. It shall be the duty of the field veterinarian to investigate outbreaks of infectious diseases among domestic animals, when

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deemed advisable by the director of the veterinary department, and to attend to such experimental and other veterinary work as may seem necessary. When not doing field work, it shall be his duty to assist the director in correspondence and other office work.

6. The field veterinarian shall have authority to order quarantine, to kill and release quarantine of domestic animals, in accordance with rules and recognized methods of the state board of health.

7. It is hereby declared the policy of the state board to pay the salary and furnish transportation for the field veterinarian. Local boards are expected to pay all his other legitimate expenses incurred in work for them.

The executive committee has considered material for a new circular of information to be issued from the laboratory, submitted by Dr. Wesbrook. Such material is reported upon favorably, and is before you for inspection and suggestions to-day.

Your executive officer has made the following trips during the past quarter:

On January 29th to Glencoe, to meet farmers, and talk about the necessity of using means to prevent the spread of hog cholera. This meeting was considered especially necessary, because of carelessness in the observation of the laws and the utter disregard of the danger of transporting the disease that had been going on throughout certain sections of the state. Among other things, a rendering establishment had been put in operation at Hutchinson, and the carcasses of hogs that had died of hog cholera had been carted to this place from miles around. This was in direct conflict with the law, and was promptly closed up.

On February 5th to Wadena, on account of the persistence of diphtheria in the place as a mild epidemic. There was little need for such a trip on my part, but it was made at the request of the local health officer, Dr. Knight. A great deal of indifference as to the proper methods of controlling this disease had been shown on the part of many at the beginning of the outbreak, but at the time of my visit it seemed to be generally understood that the rules of isolation and quarantine must be carried out if the city was to rid itself of the disease.

In March a trip was made to Warren, Henning, Vining and Fergus Falls, chiefly for the purpose of looking up lepers, in order to determine our duty to these unfortunates, and to investigate some suspicious cases. I found one leper not on our list, and one leper that died in 1890 that had not been on our list. I also investigated

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suspected cases in two different families, but found no cause for the suspicion.

On March 5th a trip was made to Minneiska, in order to straighten out certain farmers who had thought the law relating to hog cholera was not intended for use. There will probably be no further trouble on this point at this place.

On March 29th a trip to Albert Lea was made by request, to speak at a meeting of farmers on matters pertaining to the work of the state board of health.

Reports of diphtheria have been quite general throughout the state during the past quarter.

This disease is entirely too prevalent, and the cause of this prevalence is largely due to laxness upon the part of parents, teachers and health officials in the performance of their respective duties. Many of the cases have been mild in type, and this is the excuse given for the nonperformance of duty by those in authority. But such an excuse cannot be tolerated. The mild cases are as dangercus, or even more so, than are the severe cases. It is time that we should take some definite action in the matter of regulating the quarantine of diphtheria. Appreciating this fact, your executive committee recommends that this board require a four weeks' quarantine of all diphtheria cases, unless quarantine is regulated by bacteriological reports. In the latter event it is suggested that there be at least two negative reports from a responsible laboratory upon smears taken from the throat of a patient by some responsible person. We would also suggest that the period for the quarantine of scarlet fever be fixed at six weeks, and that quarantine then be released only in case of desquamation being completed.

My investigation of leprosy during the past quarter has led me to believe that while the general course of the disease is such as not to require segregation in this state, still it is necessary that cleanliness and good hygienic surroundings must be insisted upon when lepers are left with their families. So far, there is no record of an American-born individual in Minnesota becoming a leper, and we want this record to continue unbroken. It seems advisable that the necessity for recording all cases of leprosy should be impressed upon all health officers and acting health officres, and your secretary is ready to take such a course provided it is thought advisable by this board.

There is no general supervision by the state board of health over public buildings, new water supplies, new sewer systems, etc., throughout this state. It would seem to me that this board should

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be able to give valuable suggestions in such matters, and through such suggestions, save much needless expense at times to those carrying on such work.

A United States government inspector has been assigned to New Brighton. While it will hardly be possible for him to control the slaughter of unwholesome meat at this point so efficiently as has our inspector, Mr. Pomplun, it will hardly be advisable for this board to continue employing an inspector at this point alone. I would therefore recommend that Mr. Pomplun's services be discontinued after May 15, 1898.

Request has been made that authority be given to some one in St. Paul similar to that given Mr. Tilbury of Minneapolis at our last meeting. The request is that such authority be given to Dr. Price, veterinarian for St. Paul. Your executive committee recommends the granting of this request.

H. M. BRACKEN,
Secretary and Executive Officer.

June 30, 1898.

Certain matters were referred, at our last meeting, to the executive committee for consideration. It has been impossible to give these topics any attention, for the following reasons: (1) Dr. Wesbrook has been ill, and unable to attend any meetings of this committee; (2) Dr. Reynolds has been out doing farmers' institute work, and he, too, has been unable to attend committee meetings. Incidentally, it may be worthy of mention that this summer work of the farmers' institute should, and undoubtedly will, be of great value to the state board of health. (3) It was the intent that the executive committee should have conference with various representative bodies of men. This has not been done, (a) because of the impossibility of having full committee meetings; (b) because some of the representative men that we were to have met with are absent from home indefinitely.

Of the various questions referred to the executive committee, with power to act, only two have been acted upon, viz.: (1) The discontinuance of a meat inspector at New Brighton. This went into effect May 15th. (2) The placing of capable men in the field to give instructions to health officers and acting health officers, as to the best methods of controlling hog cholera. Dr. Reynolds will explain what has been done along this line in his report.

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I am sorry to have to report the illness of Dr. Wesbrook. This, while at no time a serious illness, has been such as to unfit him for active duties since about the first of May. As soon as he was able to leave his bed he was advised to go to his old home to recuperate, and your executive committee took upon itself the responsibility of forbidding his return to duty in the state laboratory before August 1st, feeling that this action was imperative for the good of all concerned. An assistant from the laboratory of the medical department of the university has been placed in the state board's laboratory during Dr. Wesbrook's absence.

Following the last meeting of our board I made a trip East. During this trip I visited Washington, Baltimore, Philadelphia and New York.

In Washington I visited the bureau of animal industry, where I gained many useful suggestions. In Baltimore the work of the state board of health was quite thoroughly talked over with Dr. Welch, and with the secretary of the Maryland board, Dr. Fulton. In Philadelphia I had time to visit only the city laboratory. In New York I visited the city laboratories, and attended a so-called sanitary exhibit. Certain conclusions are the outgrowth of this trip.

1. It seems to me advisable that, in a country so thoroughly infected with hog cholera as is this state, we should produce our own hog cholera antitoxic serum. This, of course, provided the beneficial properties of this serum are established, as I think they will be. By so doing, we could meet the demands of our people more promptly and independently than is possible when we depend upon the bureau of animal industry at Washington for our supply.

2. I am thoroughly convinced that we should produce diphtheria antitoxic serum for the benefit of the poor and our state institutions. At the same time I do not think it advisable to produce this serum for commercial purposes. The production of diphtheria antitoxic serum is beyond the experimental stage. The production of other serums is largely experimental. We should be doing this experimental work for ourselves. We are not up to date when we wait for others to do so for us.

3. We should produce our own vaccine virus, as was formerly done by this board. Here again we should eschew the commercial side, but we should supply state institutions with vaccine lymph.

4. We should be prepared to treat suspected cases of rabies in this state, and not compel such patients to go to Chicago or further East and to place themselves in the hands of those who are interested in such matters for commercial reasons only.

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5. We, situated as we are, should be able to raise all the animals needed for laboratory work, instead of being compelled to buy rabbits, guinea pigs, etc., in the market.

6. I am convinced that, in spite of all the bitterness that has been displayed by various organized bodies towards the marine hospital service, this is the proper service upon which to build an efficient national board of health. To make a success in this, there must be close sympathy between the marine hospital service and the various state boards of health. There should be annual conferences between these various bodies. It should go without saying, however, that an organization with the years of development of the marine hospital service has every advantage over any possible new organization that might be brought into existence, and that a board with a single responsible head has every advantage over a board with a representative advisor from every state.

7. It is quite evident that, to keep in the front rank, our board must be on the alert. State laboratories are new institutions, and this state, I am happy to say, was one of the first to recognize their need. But other states are taking hold of this work now. We must be prepared to do research work as well as routine work.

The various suggestions that I have made require money for the carrying out of same, but it will not be money wasted. In fact, it will not be a difficult thing to demonstrate to any thinking man the actual economy of such work.

The last biennial report of this board has not yet been published. Your executive committee has considered the need of such publication and has advised in favor of pushing the matter along. The manuscript of this last report from your late secretary, Dr. C. N. Hewitt, is now in the hands of the printer. It is the intent to publish in one volume the reports for 1895 and 1896 and for 1897 and 1898, and to have them ready for distribution as soon as possible.

The work of arranging for a license to be granted to embalmers for special work is progressing favorably. I would advise that the first examination be held on September 10th, the day following the close of the tri-state meeting of embalmers, and that the details in the arrangement for such examination be left in the hands of your secretary.

I wish to speak a good word for many of the reports from local health officers, as regards the so-called May inspection for cities, villages and towns throughout the state. The reports speak well for a poorly paid and poorly appreciated body of men. I hope the time is not far off when men engaged in sanitation may be recognized as

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public benefactors, and receive some reasonable financial recognition for their services.

In preparing for the next biennial report of this board a circular has been sent out asking for information along certain lines, as bearing upon public health. This circular was sent to forty-six cities and to fifty-seven villages, with a population of 1,000 and upwards, and to 134 villages, with a population ranging from 400 to 1,000. So far we have received fifty-seven replies from places of the first class and seventy-eight replies from the smaller villages. Returns are still coming in, and we expect a very complete report in the end. These reports will give us a very thorough knowledge of sanitation throughout the state.

I have made but few trips during the last quarter. The few that I have made have generally been to deal with matters that could have been taken care of by local boards without any help from the state board. In many cases of this kind, however, a little moral support from the state board is of great assistance to the local board, and such support should always be readily and freely given by us.

Sept. 30, 1898.

From the executive standpoint, the past has been a very busy quarter.

July 30th I visited Faribault in order to note the methods of dealing with sewage from the various public and private institutions, as well as from the city; of noting the methods for disposal of manure, garbage, slops, night soil, etc., from the city; of noting the condition of the Chicago, Milwaukee & St. Paul Railroad shipping pens. The health officer, Dr. Cool, is doing all that he can to care for the sanitary interests of the place. Faribault, with its numerous state institutions and endowed schools, should become a model city from a sanitary point of view. It has many points at fault at present, but I think it has a willing people, and that order will come out of the present chaos in due time.

In the latter part of July, at the request of Dr. Reynolds, men interested in the exhibit of swine at the coming state fair met at this office to discuss the best means of guarding against the introduction of hog cholera, or other infectious disease of swine, upon the fair grounds. The conclusions drawn were: (1) That every exhibitor should be required to sign a certificate stating that his hogs were not sick when shipped, and that they did not come from

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an infected district; (2) that pens in contact with each other be provided with double fences between the pens, in order to diminish the dangers from infection; (3) that pens be so constructed that visitors cannot enter, thus removing one source of danger of infection; (4) that all sick hogs be promptly isolated, and kept in isolation until the character of the illness is well established; (5) that all exhibition hogs, found to be suffering from hog cholera, be promptly killed and buried, or burned. It was arranged that a representative from the veterinary department of the state board be on hand to inspect hogs on their arrival and during their stay at the state fair. It was also arranged that a record of destination of all hogs going from the state fair be kept.

On August 2d representatives of the various railroads in the Twin Cities met at this office with Dr. Reynolds and myself, to discuss the best methods for shipping exhibition hogs to the state fair. It was decided that Mr. Randall, secretary of the state fair, be asked to furnish a list of possible exhibitions as early as possible to the secretary of your board, and that a copy of this list should be furnished by the secretary of this board to all the railroads furnishing transportation to this fair. The railroad representatives agreed to notify their agents that exhibition hogs must be sent in new cars, or in cars that had been thoroughly disinfected. The disinfection of cars by steam seemed to be the most feasible plan. At this meeting the question of keeping the shipping pens of the various railroads throughout the state in good sanitary condition, in order that they should not become a public nuisance, was discussed incidentally, and the general expression from the railroad representatives was to the effect that the railroad officials would gladly do all in their power to keep said pens in good order, and would consider it a kindness should the state board of health draw their attention to any neglect on the part of local agents in keeping such pens in good order. It was further stated that railroads would be glad to enforce the rule that stock must not be kept in shipping pens more than twenty-four hours, should the state and local boards require such action. It is a difficult matter for the railroads to enforce this rule without the aid of local sanitary authorities.

August 9th I attended the quarterly centennial celebration of the Michigan state board of health at Detroit. This gathering did not have as good a state representation as it should have had. Sanitation was ably presented by various state and municipal sanitarians.

Following the "celebration" on August 10th and 11th, the conference of state and provincial boards of health of North America

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held its regular annual meeting. At this conference were representatives from nineteen states and three Canadian provinces. There was a well arranged program, covered chiefly by two topics, as follows, to be answered by some representatives of a state or provincial board of health:

(a) What are the principal lines of work of your board? (b) How is each accomplished? (c) What modifications, if any, does the experience of your board suggest?

These questions were, I presume, intended to draw out the strong points from the various boards. At the same time, the intention undoubtedly was to secure answers to such in terse, forcible language. The plan followed, however, was quite different. The representatives were called in the alphabetical order of states. Answers from eight states occupied about three hours, and the greater part of this time was taken up by five men. This experience, together with a little business, occupied the greater part of our first day's work.

The second day was largely given up to a discussion on the restriction and prevention of tuberculosis. The program was well arranged. There was a great amount of material presented. Unfortunately, every one was in a hurry, and the time taken up in discussing this all-important topic was entirely too short.

Although there were a few excellent papers presented at this conference, as a whole it seemed to me a failure, and unless it changes its character, I would not advise this board to continue its membership. The papers presented that were worth hearing could all have been properly cared for by the American Public Health Association. This conference should outline work along other lines than those followed by the American Public Health Association. It has its place and its mission, and if it fails to fill either or both of these, it had better die.

August 13th I reached home again from the conference, and found great anxiety over typhoid fever at Camp Ramsey, on the state fair grounds. Sickness began there August 7th, about one month after having gone into camp, on the same ground previously occupied by the Twelfth Minnesota Volunteers.

The character of the fever was mild. The probability of infection from the drinking water was slight, for the disease, instead of appearing quite generally throughout the camp, as it would have done had the drinking water been the cause, became epidemic at once in four companies. These companies were not contiguous to one another. The St. Paul bacteriological laboratory had already

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taken up the investigation of the water supply of the camp. The state laboratory at once began a thorough investigation of all possible sources of infection, and also the work of studying bacteriologically all the cases of typhoid fever originating in the camp. At a meeting of the executive committee of this board, at which Surgeon Maj. W. J. Dennis was present, the following program was agreed upon:

1. To have two camps: (a) A new camp for the uninfected companies; (b) A camp for the infected companies.

2. Not to grant sick furloughs to any of the officers or men without notifying the state board of health of such action and giving the address of the party on furlough.

3. To have strict guard duty carried out, to prevent the too general mingling of the sick and the well.

4. That the hospitals receiving patients from this regiment be required to furnish specimens of blood from each patient every day, until the diagnosis of typhoid fever is made, and then every third day so long as desired by the state board of health.

That each hospital be required to make the diazo reaction test for each patient after the above manner, as regards time.

That urine be furnished the state board of health laboratory, in sterilized receptacles furnished by the laboratory, every three days after the serum reaction, so long as desired by laboratory (i. e., until the presence of bacilli is established).

That a personal history be furnished the state board of health for each case for the two weeks previous to the appearance of the illness.

That a complete diet list for soldiers in camp, including bread, meat, milk, water, ice, vegetables, etc., be furnished the state board of health; also, the methods of keeping food before and after cooking.

That special examination of faeces, earth, straw, flies, etc., be made by the state board of health laboratory, as thought necessary.

5. That for each patient, the name, rank, company, tent number, previous residence, present residence, date of appearance of illness, be given.

About August 20th the question of moving the Fifteenth Regiment from Camp Ramsey to Fort Snelling reservation was discussed, and on August 23d the move was made.

The working of this board in conjunction with the army officials, looking to the control of this epidemic, has been most harmonious and satisfactory from beginning to end.

In order to remove all fear as to the safety of the fair grounds

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for fair purposes, the state board of health was asked to take the matter in hand, and this was done. The state fair officials were requested to pursue the following course:

To disinfect the old camping grounds by burning straw over them, and then to sprinkle them over with a three per cent solution of crude carbolic acid.

To fence off the area including the sinks in the new camp.

To disinfect and fill all small vaults, and to use plenty of lime (two barrels or more) in each of the large vaults.

To burn all the small water closets.

To whitewash under the seats of the large water closets; to cleanse the floors and seats thoroughly, and to paint the side walls up to the rafters.

To disinfect all tanks and water pipes with steam, forcing it to escape through the various taps on the grounds.

To disable all pumps, thus preventing the use of any of the wells on the grounds.

To make connection with the St. Anthony water system, thus securing water for the grounds that would be above suspicion.

To sprinkle lime on the grounds where water has been standing about the pumps.

To disinfect all the camp trenches, using plenty of lime, and to whitewash the fences near the trenches.

To use lime in the stable where the regimental horses were kept, and to whitewash the walls; to use lime on the manure about these stables.

To clean the late commissary building thoroughly.

All this was well done, under the supervision, at my request, of Dr. Geo. A. Gray.

On September 9th was held the first examination for embalmers, under our new regulation for the preparation and shipment of dead bodies. The result was most satisfactory. Every one seemed pleased with this plan. Ninety-six applicants were examined, of whom eighty-four passed. I would advise that these requirements, as well as the rules we have adopted to govern the transportation of dead bodies, be put into effect Nov. 1, 1898, and following.

September 10th I went to Merrilan, Wis., to meet the hospital train on its way home from Tennessee and Kentucky with sick soldiers from the Twelfth and Fourteenth Minnesota Regiments. In all there were 175 cases. Many of these were convalescents. About sixty were sent to hospitals in St. Paul and Minneapolis. We have tried to get track of all these sick, and where typhoid fever cases

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have been sent home, to notify the local health officer to that effect, in order that he might be on his guard. We have not met with the assistance that we should have had along these lines; hence our work must be very imperfect. It will be a most fortunate occurrence if typhoid fever does not become epidemic in this and other states after the return of troops from the various typhoid infected camps throughout the country. While we are crying out against those countries that have neglected to take such sanitary precautions as to control yellow fever, we should not forget our own country when typhoid fever still prevails to such an extent.

September 17th I received a letter from the health officer at Delano, stating that a body had been received there from Walker, Minn.; that the cause of death was given as, "acute laryngitis—not a contagious disease." Acute laryngitis not being recognized in itself as a cause of death, and other circumstances connected with the case, made it seem probable that it was a death from diphtheria, concealed for purposes of shipment, as our present rules prohibit the shipment of the remains of those who have died of diphtheria. September 19th I went to Delano, and in company with three other physicians, Drs. Shannon (coroner), Shrader and Catlin, had these remains exhumed and a post mortem examination made. The clinical, as well as the bacteriological finding, marked the disease as diphtheria. A membrane was found in the larynx extending into the trachea. It was not possible to examine the pharnx or nasal cavities without great mutilation of the remains, and this I did not consider necessary. The *b. diphtheriae* was found on a culture taken from the nostril, a culture taken from the larynx, and also from the membrane found in the larynx and trachea. Dr. Wesbrook will probably report further on this case.

With such a condition proven, I thought it necessary to take action promptly as follows:

Sept. 21, 1898.

Dr. T. F. Rodwell, H. O., Walker, Minn.,

My Dear Doctor: On your certificate of, "Acute laryngitis—not a contagious disease," the remains of Wallace Plath were shipped to Delano, Minn., September 15th, for interment. September 19th I had the remains exhumed, and found evidences, both clinical and microscopical, of diphtheria.

Will you please explain why you issued the certificate upon which this body was shipped? Will you also inform me how many more cases of diphtheria there are in Walker.

Permit me to draw your attention to the fact that acute laryngitis is not recognized as a cause of death, without an explanation as to *its* cause; also, to the inclosed marked copy of the law.

Very truly,

(Signed.) H. M. BRACKEN.

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A somewhat similar letter was sent to Dr. Geo. S. McPherson, health officer at Brainerd, Minn., who had also signed the shipping permit.

I also wrote to the undertaker who prepared this body as follows:

Sept. 23, 1898.

Mr. E. W. Lynch, Brainerd, Minn.,

My Dear Sir: Your name appeared on the box containing the remains of Wallace Plath, shipped from Walker to Delano, last week.

Did not you know, or suspect, that this was a case of diphtheria when you prepared it for shipment? It was shipped as "acute laryngitis," stated to be "not a contagious disease." I had the body exhumed, and the disease proven to have been diphtheria. There had been a public funeral; the hermetically sealed box had been cut open and the remains "viewed"—quite permissible if the death was not due to a contagious or infectious disease.

Embalmers who hold our special license will have to look out that such occurrences as this one do not happen under their supervision.

Inclosed find some marked copies of laws and rules.

Respectfully,

(Signed.) H. M. BRACKEN.

September 20th had been set as the day for meeting with the general baggage agents of the various railroads operating in Minnesota, to discuss the form for shipping permit in connection with our new rules for the transportation of the dead, and any other matters pertaining to this subject that should present themselves. Messrs. W. H. Lowe of the Northern Pacific Railroad, E. F. Woode of the Chicago, St. Paul, Minneapolis & Omaha Railroad, A. Frazer of the "Soo," and J. B. Hanson of the Duluth, Mesaba & Northern Railroad were present. No final recommendations were made because of the small representation of railroad men. The general sentiment seemed to be in favor of putting our new rules into effect Nov. 1, 1898. It will, of course, be necessary to issue a circular setting forth our action, and the reasons for it, when the proper time comes. It will also be necessary for us to learn what other states will do in case they have not yet changed their rules or regulations to conform to these new rules. Will they receive bodies shipped from this state under these rules?

September 24th Mr. W. J. Underwood, assistant general superintendent for the Chicago, Milwaukee & St. Paul Railroad, Mr. E. Clemmons and myself visited Faribault, in order to meet with its board of health and city officials to discuss the best plan of procedure in dealing with the shipping pens at this point. The railroad officials were quite willing to do what was asked of them. It was decided to floor, with ties or planks, all the pens with sheds;

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to move the partition fences so that there would be more pens than at present; to exclude stock from pens without floors; to floor the alley with ties or planks; to gravel the unloading and crowding pens.

It is also understood that stock is not to be kept in the unloading or crowding pens. The city is to assume the responsibility of keeping the pens clean. The railroad is willing to pay to the city the amount that it now pays to a private individual for cleaning the pens (seventy-five dollars). At this meeting were present Hon. Peter Ruge, mayor, Dr. D. M. Cool, health officer, and Mr. Warren Metting, street commissioner.

I see no reason now why these yards should any longer be a public nuisance.

We were fortunate in meeting and talking with a member of the shipping firm of Carver Bros., who approved of the plans, judging from the shipper's standpoint, and said we could depend upon the shippers to aid in every way possible the keeping of these pens in good condition.

Pulmonary tuberculosis being now recognized as an infectious disease, I would recommend that this board publish the following regulations for sanatoria, hospitals, etc., set aside for the treatment of this disease.

1. Patients attending such sanatoria, hospitals, etc., must not be allowed to go outside of the grounds belonging to such institution while under treatment, unless accompanied by an attendant.

2. Attendants upon patients of said sanatoria, hospitals, etc., must see to it that the patients of such institutions, both within the inclosures connected with said institutions and wherever else they may be permitted to go, must expectorate into some receptable or substance that is carried by the patient, and subject to thorough disinfection,— a spit cup, a paper handkerchief, or some other suitable device.

3. Sanatoria, hospitals, etc., in which tuberculous patients are treated should not be in cities or towns, unless it is possible to locate them where there is an abundance of ground space, with cheerful scenery and surroundings.

These establishments, while very necessary for the care and treatment of tuberculosis when properly conducted, must be looked upon as foci of infection, and residents in close proximity to such institutions have just cause for complaint if the rules set forth are not observed.

The executive committee has thought it wise to recommend that the Bertillon classification of causes of deaths be adopted in our vital statistics report. It is not necessary that we should change

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from our present system at once, but simply that we announce our willingness to change when a sufficient number of states are ready to take concerted action looking to a more uniform classification than now exists. The weak points in the Bertillon system were discussed by your executive committee, and all felt the need for some concerted action in eliminating as many of these objections as possible before the system is finally adopted by this and other states.

It was found that Mr. A. K. Bush of Dover, Minn., was ready and willing to do what he could to aid this board in its efforts to control hog cholera, and the executive committee thought it well to give him authority to act as a special agent in reporting the disease and aiding local health officers in enforcing quarantine. This authority carries with it no financial obligations.

The importance of guarding state institutions, and at the same time making them model institutions, being recognized, the executive committee thinks it would be wise for this board, through its veterinary department, to inspect the dairy herds of these institutions twice each year, using tuberculin as a means of eliminating all tuberculous cattle.

September 27th to 30th I attended the meeting of the American Public Health Association at Ottawa. It was a well attended and profitable meeting. Minneapolis was named as the next meeting place for this association.

On reaching home from Ottawa, October 2d, I found an urgent call for a visit to St. Cloud and vicinity, to advise with the local authorities as to the best means of dealing with an outbreak of diphtheria. I responded by going to St. Cloud the same afternoon. It seemed to me that very suitable action had been taken to prevent the general spread of the disease. Several cases of sore throat that had been diagnosticated as tonsillitis had occurred before the diagnosis of diphtheria was made. There had been no bacteriological examination in any of these cases of supposed tonsillitis. It is quite probable that some of these, at least, were mild cases of diphtheria. One school in a suburb of St. Cloud had been closed because of this outbreak of diphtheria.

There has been a good deal of newspaper excitement over "lumpy jaw" cattle supposed to have been killed at New Brighton, with the meat placed upon the markets of St. Paul and Minneapolis.

As a matter of fact, this abominable business has been carried on for years in the vicinity of St. Paul, Minneapolis and Duluth, and probably other places within this state. There is no means at pres-

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ent for controlling such proceeding. This emphasizes the need of passing such laws at our next legislature as to prevent the possibility of placing diseased meat upon the market for use as food. It is altogether probable that fewer lumpy jaw cattle have been killed at New Brighton this year than usual, for this board has had valuable inspection by Dr. Keane, the federal government inspector, rendered us gratuitously. Dr. McBride has done similar work at South St. Paul for the state. We should express, as a body, our appreciation of such services. They are of great benefit to us, for we have not sufficient means to employ suitable inspectors for this work. Dr. Keane informs me that over sixty "lumpy jaw" cattle have been condemned at New Brighton this fall.

There should be legislation at our next session looking to the proper inspection of meat and the control of slaughter houses.

Gen. C. C. Andrews, chief fire warden of the state, has recommended the purchase of a tract of land on the south shore of Cass lake, bearing white and red pine. He suggests that the state medical society should look into this matter. He also suggests in a letter that this board take some interest in investigating this district as one well suited to the establishment of sanatoria for the care of tuberculous patients. His suggestion is worthy of consideration, and is in line with a resolution passed at the late conference of state boards of health, which is as follows:

Resolved, That this conference does publish, and instruct the secretary to forward, copies of these resolutions to the legislatures, departments of education and municipal authorities of the several states and provinces represented in this conference, urging upon them the imperative need of—

1. Having all schools and colleges placed under medical supervision, with regard to ventilation, over-crowding and over-pressure in studies.
2. Having all hotels, boarding houses and workshops where consumptives may be employed placed under municipal supervision and inspection.
3. Urging all state legislatures to devote public funds and encourage private philanthropy in the establishment of homes, or sanatoria, in one or more counties or districts of the several states and provinces, to which patients may be sent early, either at their own or municipal expense, and, under proper regulations, be encouraged to remain therein until recovery shall have taken place, while at the same time, they shall have prevented the continuance of centers of infection in their homes.

Because of the complaints that had come to this board some time ago regarding the shipping pens at Albert Lea, I visited this city October 8th. I can see no reason why these yards should be a nuisance, judging from the sanitary point of view, and am disposed to think the railroads will do their duty in trying to keep them in proper condition. The pens of the Cedar Rapids & Northern Railroad and Minneapolis & St. Louis Railroad are in very good condi-

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tion. Several of the pens have cement floors. One large pen has a gravel and cinder floor. The alley way is paved with cobble stone. The Chicago, Milwaukee & St. Paul Railroad pens are in an uncertain condition, because of the city's action in ordering them to remove. These pens can undoubtedly be put in good sanitary condition when some definite plan for the future is settled upon.

On the same date I visited Waseca. An important question is now under consideration at this place, viz., the disposal of its sewage. This question is one that is going to demand much thought and attention in the near future. Waseca is on low ground. It has no river to drain, and consequently cannot become a law breaker, as so many other cities have done. It seems to me the place is well adapted for disposal of its sewage by the filtration method. This is a problem for our board to aid in solving.

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QUARTERLY REPORTS

OF THE

BACTERIOLOGICAL LABORATORY, 1897-1898.

March 31, 1897.

In accordance with the action of the board, by which a sum not to exceed $500 was to be expended in further laboratory furnishing and extension, the laboratory has now in use five well-furnished rooms, of which a more correct idea may be obtained by personal inspection (for which to-day affords an opportunity) than by any verbal description. By this change a more complete separation and systematic arrangement of the different branches is possible.

The workers in the laboratory are as follows: Dr. F. F. Wesbrook, director; Dr. L. B. Wilson, assistant bacteriologist; Dr. O. McDaniel, temporary assistant; H. Charleston, janitor. Messrs. Magee and Hare, students in the medical department of the university, continue to give gratuitously their services, without which it would have been impossible to have accomplished nearly so much as has been done. Dr. Fritz Baumann, a graduate of Königsberg University, Germany, and a pupil of Professors Frankel and Von Esmarch, who is an experienced bacteriological chemist, has entered willingly into the service, in return for what he is able to learn in reference to pathogenic bacteria.

With the consent of the executive committee it was found necessary to engage Mr. W. P. Moorhead, from 22d March to the date of this meeting, to do clerical work, of which there is such a vast amount, in the filling in of reports, filing and rearrangement of data, that, with the limited amount of time which Mr. Moorhead can afford to give, there is a constant dropping behind, and the records cannot be kept in the best possible condition.

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To the system of the preservation of various data, as well as to the general and special work of the laboratory, the attention of the board is asked to-day. Suggestions and criticism are invited.

Circular of Information, No. 1, has been printed, and is being put into circulation from the secretary's office. This seems to be answering a useful purpose, in affording the most necessary information to those desiring or needing it.

The sending of the reports of all examinations to the local health officer, as well as to the person asking for the examination and to the secretary of this board, will, it is hoped, aid materially in placing the work of the laboratory in its proper place; that is, as a means employed by the state board of health for locating and ultimately eradicating sources of infection.

A difficulty is often met with among those taking advantage of the facilities afforded by the laboratory in obtaining data and information, which alone will make the work of value, on account of their purely personal and erroneous impressions in regard to its *raison d 'etre.* It seems very difficult to establish the fact that the aim of the laboratory is not alone to furnish diagnoses as the bases for treatment, but that it is a part of the machinery of this board for the location of danger and the testing of the value of new methods.

As the conditions to which reference was made in the annual report still exist, and there has been no decrease, but the reverse, in the routine work, the present report of work done during the last three months must be almost exclusively confined to a simple synopsis of the number and character of routine examinations.

It is expected that during the next three months there will be a decrease in the work, which will permit of the arrangement and tabulation of all details of interest, and the completion of investigations necessary before the publication of papers on "Diphtheria," the "Serum Test for Typhoid Fever," and "Rabies." The permission of the board for the arrangement and publication of such papers as soon as possible is now asked, as well as an expression of opinion as to the method to be followed.

The need of literature accessible to the workers in the laboratory is one which is apparent to everyone. It would seem that, unless it be contrary to the laws under which this board operates, a transference of the library, at present in the secretary's office, where it is not of the greatest value to the laboratory, would be beneficial.

The following is a list of the diphtheria examinations made from Jan. 1, 1897, to March 31, 1897, inclusive:

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During January	241
During February	181
During March	143
Total	565

These were from the following places:

Minneapolis (including city hospital)	239
Owatonna—Public school (Dr.J.H.Adair)	229
Owatonna—Other doctors in town	25
Austin	20
Brownsdale	7
Northfield	6
Wabasha	4
St. Paul	4
Mabel	4
Mapleton	3
Lyle	3
Farmington	3
Spring Valley	3
Jordan	2
Wahpeton, N. D.	2
Blooming Prairie	2
St. Cloud	2
Royalton	1
Marine Mills	1
Rose Creek	1
Wadena	1
Monticello	1
Osakis	1
Lanesboro	1
Total	565

Many of these were reëxaminations, and in this connection it may be mentioned that some very interesting observations have been made upon the long persistence of *bacillus diphtheriae* in the throats and posterior nares of patients, in addition to those reported at the annual meeting of the board in January.

The bacillus has been found to persist so long as 42, 55, 71, 82, 90 and 110 days in certain cases which have begun as and run the course of ordinary clinical diphtheria.

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In spite of the great pressure of routine work experiments have been done, and are still in progress, for determining the relative virulence of these forms which have persisted so long. One case may be of interest. In the practice of a Minneapolis physician, the disease had developed in child A, which was communicated to the father, a man thirty years of age. No other member of the family, besides these two, exhibited symptoms of the disease, but on repeated examinations of the throats of the others, *B. diphtheriae* was found in all (three), as well as in a pug dog, making six in all.

The bacillus was isolated in pure culture, and a specimen from the father, at the end of ninety days, when grown in dextrose bouillon for forty hours, in a dose of 1 c.c., killed a guinea pig of 200 grammes weight in forty hours. The micro-organism, typical in every respect, was recovered from the seat of inoculation in the animal.

In the public school at Owatonna, as before reported, this bacillus seems to be so common that it is very often found (and, too, on repeated examinations extending over a period of some months) in the throats of children who have exhibited no symptoms during its residence there, or for some time previous to the investigations.

In all such cases and in all cases of long persistence the micro-organism is obtained in pure culture, and it is hoped that gradually the pathogenic effects and cultural peculiarities may be satisfactorily determined, when, with the clinical histories and local notes which have been kindly placed at the disposal of the laboratory, most valuable material may be got ready for publication.

All peculiar bacteria, closely resembling or suggestive of *B. diphtheriae*, are also carefully collected and obtained in pure culture, in order to establish or overthrow the possibility of connection between them and the disease. The pathogenic properties of thirty-nine different cultures have been already determined by inoculation into guinea pigs.

Special Notice No. 3 has been issued, by means of which it may be possible to obtain some idea of the value of the different antitoxines offered for sale in this state. (For "Special Notice No. 3" see page 190.)

TYPHOID.

Since the January meeting of the board the work of the examination of specimens of blood from suspected cases of typhoid fever has been added to the routine work of the laboratory, and this has in-

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creased proportionately to the decrease in the diphtheria examinations, as the following list will show:

During January	35
During February	105
During March	254
Total	394

In spite of requests for reëxaminations, whether positive or negative diagnoses have been given, it has been impossible to secure more than a few, so that the 394 examinations are mostly all from different cases.

The epidemic which has been in progress for the last few weeks in Minneapolis has afforded an opportunity for observations on a larger number of cases than has hitherto been published. This opportunity has not been neglected more than has been absolutely necessary. The chief difficulty has been in obtaining collateral data, and to obviate this as far as is possible where cases occur, as they largely have done, in private practice, the following "Special Notice, No. 4," has been sent to each physician in each case sent in for examination by him. (For "Special Notice, No. 4," see page 193.)

When all returns are in, and the laboratory experiments at present in progress are finished, it is hoped that the results will be of value for publication.

Unfortunately, owing to the occurrence of a large proportion of the cases in private practice, and the difficulty of obtaining blood from the patients in sufficient quantity and under aseptic precautions, only one method of collection and examination has been pursued, namely, the dried blood method of Wyatt Johnson. By this method, the directions for which, from the standpoint of the physician, are given in the "Circular of Information" (see page—), the laboratory has had very great success in the diagnosis of the disease.

Of the cases observed a reaction has been obtained usually in from the second to the eighth day of the disease.. Three cases have been observed in which it did not appear until much later. The method pursued has been, briefly, to soak up the dried blood smear with about twenty-five times the amount of distilled water, and, taking a platinum loop of the slightly tinted fluid, to transfer it to a cover slip. This is then inoculated with a loopful of a twenty-four-hour broth culture of typhoid, or, by means of a fine platinum needle, with a small amount of fresh agar culture (twenty-four hours old),

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and inverted over a hollow ground slide and cemented with vaseline. The specimen is examined immediately, and the presence or absence of the reaction noted. It is then usually allowed to stand for from one to two hours, and examined again and notes made, but in any case it is allowed to stand over night and examined in the morning, when it is finally reported on.

It often happens that the reaction may be well marked after sixteen hours, when not present at the end of an hour or two.

So far there has been very little, if any, conflict between the ultimate clinical diagnosis and that of the laboratory. There have been cases of a delay in the appearance of the reaction until a rather late stage of the disease.

Altogether the results obtained in this laboratory point to the great utility and extreme importance of this method as an aid to clinical diagnosis.

There has been no trouble from the appearance of the so-called pseudo-reactions of other observers, which expression seems to cover a multitude of phenomena.

All grades of intensity of the reaction have been observed, but the reaction has only been pronounced complete and satisfactory when distinct clumping and complete immobility of the bacteria were obtained.

The greater number of these observations have been made by Dr. Wilson.

In connection with the epidemic at present in Minneapolis, attention is naturally directed to the peculiar time of the year at which it has made its appearance. No satisfactory theory has yet presented itself to explain why this season of the year should have brought forth an epidemic, though the finding of *B. typhi abdominalis* in the city water plainly demonstrates the probable source of infection.

The bacillus found answers all the reliable tests, and amongst others reacts to all the samples of blood from typhoid cases with which it has been tested.

The bacillus was found by making cultures from the surface of the Nordmeyer-Berkfeldt filter in use in the laboratory and through which the drinking water is passed.

The finding of the bacillus has been reported to the city health commissioner of Minneapolis. *B. coli commune* was found also in abundance in the same sample.

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WATER EXAMINATIONS—BACTERIOLOGICAL.

Eight examinations only have been made during the last three months, and these have been mostly in searching for *B. typhi abdominalis.* In no case was it found except in the sample from the laboratory tap. The samples examined came from Minneapolis, Mountain Lake, Rochester, St. James and Morton.

A somewhat suspicious bacillus, isolated from one of the samples sent in from Mountain Lake, was used for inoculation experiments upon two guinea pigs, without, however, showing any interesting results. This was shown also culturally to be not typhoid.

In most of the specimens as collected, even after the very fullest directions have been sent, the bacteriological examination, which may mean a work of from five to thirty days, is not often of value. The bacillus of typhoid is difficult to demonstrate, and when it is not found, its absence is not proven.

TUBERCLE EXAMINATIONS—SPUTUM.

During January	14
During February	8
During March	18
Total	40

Inoculations into guinea pigs.

From supposed tuberculous milk	2
From supposed tuberculous growth	1

Negative results in all three inoculations.

EXAMINATION FOR RABIES.

The work, of which a synopsis was given in the annual report, has been continued, and, in addition to the work then reported, fifty-one rabbits have been used for inoculation experiments in eleven cases, most of which originated in St. Paul.

In the seven cases coming from St. Paul a positive diagnosis has been given in all excepting one, which one has already been reported to this board in detail.

Four other cases were examined from Newmarket, New Auburn, Mora (Kanabec county) and Benson. In these positive results were obtained in all cases, and a diagnosis of rabies given, except in one

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instance, viz., that from Benson, where a provisional positive diagnosis was given pending the completion of the investigation.

The following is a table of experiments in one case, with results thus far obtained.

CASE NO. 8—SCOFIELD.

Rabbit No.	Source of Material Inoculated.	Date of Inoculation.	Date of Death.	Duration of Disease.	Remarks.
41	Mongrel collie dog's head (emulsion of cord).....	March 3d...	March 19th	16 days.....	Had no rabbit on hand and could make no inoculation from No. 41.
42		March 3d...	April 2d....	30 days.....	From this inoculated Nos. 66 and 67.
66	From emulsion of cord of rabbit No. 42	April 2d....	April 16th	14 days.....	
67		April 2d....	April 14th	12 days.....	
72	From emulsion of cord of rabbit No. 67.....	April 14th	.....	.....	Inoculated subcutaneously.
73		April 14th	.....	.....	

The mode of procedure is to make an emulsion of the cord or medulla, which has been aseptically removed from the head, in sterile salt solution 0.67 per cent. This is with all aseptic precautions inoculated subdurally into two rabbits, which are watched and temperatures taken daily. The animals usually die in from fifteen to twenty-five or thirty days after showing signs of rabies, as it is to be observed in rabbits. Both the original emulsion and the site of inoculation after the death of the animal are tested by making cultures, in order to show that no ordinary microbes caused the lesions. In all but two cases out of over seventy animals inoculated thus far no growth has been obtained.

This fact, with the duration of disease induced, symptoms observed and post mortem appearances found, has led to the diagnosis.

In one case most of the emulsion was given subcutaneously over the head, because it refused to remain under the dura, and escaped through the puncture. Here death was delayed until forty-two days after inoculation. It, however, occurred as usual then, with usual symptoms and post mortem findings.

Some experiments are now in progress by means of which it is hoped that, by the use of some of the dried cords, some animals may be immunized, and these will be used then as controls.

If these experiments are successful, no possible doubt can exist, nor can there be any reasonable doubt at present. The further experiments are desired, both as confirmatory, and to endeavor to make some observations on the immunizing and curative properties of the serum of such immunized animals.

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GLANDERS EXAMINATIONS.

Four examinations, both by culture and inoculation into guinea pigs, were undertaken for the purpose of controlling the results of the use of mallein in a valuable horse. These were without result in the demonstration of *B. mallei*.

ANTHRAX EXAMINATIONS.

Five examinations were made for the purpose of diagnosing this disease, and five guinea pigs were inoculated. All results negative.

SWINE PLAGUE—HOG CHOLERA.

In these diseases, although the laboratory has been anxious to make examinations in regard to a possible serum diagnosis, it has been impossible to obtain material. It is hoped that Dr. Reynolds will be able to secure material in the near future for carrying on this study.

F. F. WESBROOK, M. D.,
Director.

June 30, 1897.

Since the last meeting of the board the additions in the laboratory, then almost completed, have been put into working order, with the result that the workers find less difficulty and much more comfort in following out their routine duties. As will be seen from the reports and tables given below, there has been some slight falling off in the number of the routine examinations made, as might have been expected at this season of the year. The time in this way made available has been utilized in prosecuting some research work, the necessity of which has long been apparent. In connection with the working of the laboratory, some changes in the personnel might be mentioned. Dr. O. McDaniel, who for some time during the initial stages of the laboratory gave her services without reward, and who was temporarily assistant before the appointment of the present assistant, Dr. Wilson, and who has since January 1st been kind enough to act temporarily as second assistant, has been succeeded by Dr. A. W. Miller. I wish here to express my appreciation of Dr. McDaniel's services. Mr. Magee and Mr. Hare, students in

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the medical department of the University of Minnesota, have left temporarily during the summer. Dr. Fritz Baumann has left here, and is at present working in the Chicago health department. Prof. J. Dice McLaren of the Agricultural College of South Dakota has come, with the intention of working in the laboratory for some months. Dr. McDaniel still works occasionally in some of the researches in which she is interested. Mr. Gray, a student in his final year in the University of Minnesota, as well as Miss Fosse, Dr. Hewitt's assistant, are both engaged in work in the laboratory as well. I would like to point out that Mr. Moorhead has been giving his services, until June 1st, for a part of the day, and since that time has been employing his whole time in the work of correspondence, records and compilation of data.

The following is a synopsis of the diphtheria examinations for the last quarter:

DIPHTHERIA.

Place.	April.	May.	June.
Minneapolis	28	28	18
Owatonna state public school	69	98	146
Owatonna—Other doctors	1	...	...
Fairfax	2	...	6
St. Cloud	...	1	...
Lyle	...	1	...
Farmington	13	16	1
Brookings, N. D.	1	2	...
Faribault	...	1	...
Minnesota Lake	...	2	...
Spring Valley	1	...	...
Adrian	...	1	...
Butterfield	1	3	...
Fort Snelling	...	1	1
St. Paul	...	1	...
Lanesboro	...	...	2
Blooming Prairie	...	...	2
Northfield	...	...	1
Total (448)	116	155	177

As will be seen by the foregoing table, the number of examinations has decreased, as is usual at this time of year. At Owatonna, in the state public school, the number of examinations cannot be

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taken as an index of the prevalence of this disease, since the medical officer (Dr. Adair) has, as you already know, been indefatigable in his efforts. In response to repeated requests, and in accord with an old promise, I visited Owatonna in the beginning of May, and found that by making examinations according to the culture test in this laboratory, Dr. Adair had been successful in grouping all the children, whether sick or well, in whose throats *B. diphtheriae* had been found, in one building (the quarantine building). All children recently admitted are placed in the hospital, and should they develop diphtheria, as evidenced by the presence of *B. diphtheriae*, as is too often the case, they are then placed in the quarantine building.

The suggestions which arose were sent to Dr. Adair, in a letter of May 6th, of which the following is a copy:

May 6, 1897.

Dear Dr. Adair: I would make the following suggestions as a result of my visit to the state public school on Saturday last:

1. The plan which you have adopted of testing the occupants of the different cottages for the presence of *B. diphtheriae* is a good one. A continuance of this will enable you to know which among the children may serve as a focus of infection. By placing such as show the presence of *B. diphtheriae* in the throat in rigid quarantine in one building you will limit the possibilities of infection to that building. It is unnecessary to urge the disinfection of the locality from which they have been removed.

2. It will be necessary, after having placed such children in one building, to separate them entirely from each other, so that complete isolation is secured. It would appear from our experience of the last few months that the contagion is from throat to throat more than from any infected building to the children. With this in mind it is easily seen that so long as one child has bacilli in his throat he possesses the power to infect others who might otherwise become free or who had already become free.

3. After we have pronounced the throat of any patient free of the bacilli, under existing circumstances, where all diphtheria patients are kept together, the possibility of infection of a once clear throat is very apparent. After securing complete isolation, I would suggest that we be allowed to make two examinations which both show the absence of bacilli before such case is allowed to return to the cottage from which it came.

4. The use of tents during warm weather may facilitate matters, so long as isolation is possible. During the time of stay in the tents both the ordinary hospital and the quarantine hospital can be thoroughly disinfected. The important point, so far as our researches carry us, seems to be the necessity of a complete isolation of children showing the presence of bacilli, whether well or ill, not only from other children but from each other, so that when once the throat is clear there remains no possibility of reinfection. On the matter of determining absolutely the disappearance of these bacilli from a throat, I have personally pointed out the necessity of great care in taking the swab, and have above expressed the wish that we be allowed to make two negative reports on each case. In writing this, I am exceeding the du-

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ties of my position, and shall forward this letter to Dr. Bracken, the secretary and executive officer of this board, for his indorsement and any additions which appear to him advisable. I understand from Dr. Bracken that he will shortly visit you also. Any further information or suggestions which I can offer are at your service.

Yours very truly,

F. F. WESBROOK.

The provisions for quarantine were all too inadequate, and as the medical officer has apparently a great deal of difficulty in securing the requisite accommodation and equipment to enable him to cope successfully with what has become a very serious matter, it would seem well if this board should pass some recommendation which might strengthen his position, or perhaps it might be possible to meet there next time, should it be agreeable to the school authorities and the members of this board.

Experiments are now in progress to test the pathogenic properties of typical diphtheria bacilli, isolated from cases of clinical diphtheria, as well as those obtained at short intervals during some months from children in whom no clinical symptoms of diphtheria were observed.

A bacillus has been found present in many throats, both where clinical diphtheria was observed and where no symptoms were at any time evident, which culturally and morphologically differs somewhat but not very greatly from *B. diphtheriae.* This has been called temporarily, for purposes of identification, "*B. Owatonnae.*"

It was found in many cases quite as virulent for guinea pigs as *B. diphtheriae.* The morphologically typical bacilli, isolated from cases in which no symptoms have been observed, are often fully virulent.

Comparative experiments are in progress, which had to be suspended during May and June, as no guinea pigs were available.

During April thirty-eight guinea pigs were inoculated and in May five.

In connection with "*B. Owatonnae*" it might be mentioned, that, in the throats of patients under examination at frequent intervals for a long time where this form was present originally, it has been observed either to change into or be replaced by typical *B. diphtheriae,* and vice versa.

A point of interest arising out of the work might be mentioned. A certain physician residing in one of the Twin Cities, in whose throat *B. diphtheriae* had been demonstrated during an attack of the disease, came to the university and asked one of the senior students

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to take a smear from his throat for examination. This was brought in, and it afterwards transpired that during the temporary absence of the student, and immediately prior to the taking of the specimen, the physician washed out his throat with corrosive sublimate, 1 in 1000, and afterwards with ninety-six per cent alcohol. The culture was slow in developing, but in about thirty hours an almost pure culture of *B. diphtheriae* grew, and the facts in the meantime having come to light, the commissioner of health of that city was notified and all data placed in his hands.

TYPHOID FEVER.

Although in the beginning of April a great number of examinations were made by means of the blood test, the number of cases has since decreased. In obtaining full data for all cases examined there has been the utmost difficulty, since, whether an examination yields positive or negative results, the physician is usually satisfied with one examination. There are, however, a few exceptions to this, and we expect to have some statistics of value. Our "Special Notice, No. 4" has been very useful in the obtaining of results in the way of clinical data concerning cases upon which a laboratory opinion has been given.

The following is a table of the examinations for typhoid fever made during the last three months:

Place.	April.	May.	June.
Minneapolis physicians, including city hospital	177	143	120
Winona	1	3	...
Monticello	...	2	...
St. Paul	2	...	1
Farmington	1	...	...
Owatonna	...	3	...
Butterfield	...	2	...
Hibbing	...	2	5
Total (465)	181	156	129

As will be seen, there has been an increase in the examinations over the preceding three months, which is not to be ascribed to an increase in the disease, but physicians are becoming more willing to furnish materials for examinations. The result of the examination of the water of Minneapolis, as supplied through the laboratory tap,

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was reported informally at the last meeting, although the work was not completed and a full report made until during the quarter just passed. As will be remembered, *B. typhi abdominalis* was found in this water, and its presence reported to the health commissioner of Minneapolis. It may be well to remark that no steps whatever were taken in the matter towards warning the people of the positive presence of this micro-organism. The microbe obtained is very often far more sensitive to the reaction with the blood of a typhoid fever patient than is the stock laboratory culture.

It may be added that the number of cases has increased in July, according to our examinations. A report of this will be, however, in order the next quarter.

TUBERCLE.

During April fifteen examinations were made for the presence of *B. tuberculosis* in sputum, during May twenty-one and during June eleven, making the total of forty-seven.

RABIES INOCULATIONS.

During April sixteen inoculations were made; during May, ten; during June, thirteen; making a total of thirty-nine.

These inoculations were not for the purpose of diagnosing cases which had arisen during that time, but were a continuation of the passage of the virus from certain cases through a further series of animals, not only to increase the intensity, but to preserve it.

At present we have three animals immune, one of which has been most thoroughly tested. With this animal and the others it is intended to study the protective and curative action of the serum.

A report has already been given of the findings in all of the cases in which we have been called upon to make examinations.

EXAMINATION FOR GLANDERS.

During April two and during May four examinations were made, without results which would indicate the presence of *B. mallei*. Three of these examinations were for the purpose of testing some suspected mallein, upon the peculiarities of which Dr. Reynolds may have something to report.

ANTHRAX.

Two examinations were made during April to determine the presence of *B. anthracis*. The bacillus was not found.

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WATER EXAMINATIONS.

During April two examinations were made, and during May two.

In the present impoverished condition of the board, which partly results, if not wholly, from the expense of running the laboratory, and for which no financial provision is made, it is with hesitation that the necessity of something more in the nature of a library is asked for. The necessity for having books, and more especially magazines, containing articles upon the subjects in which the work is being done in the laboratory, is so apparent that it warrants this request even at such a time.

Dr. Bracken is not averse to the procuring of the library, but has, as his position demanded, pointed out the financial condition of the board. At his suggestion, a number of the books at present in the secretary's office, which would be more useful in the laboratory than where they are at present, have been selected, and will be, with the permission of the board, removed to the laboratory.

The work in diphtheria and typhoid fever has proven very interesting, and when the experiments at present under way have been completed without doubt some valuable data will have been obtained.

With your permission, I should like to arrange some of this material in the form of two papers for the British Medical Association, which meets in Montreal on the last day of August and the first three days in September. I wish also to present papers on these subjects, and probably on rabies, at the meeting of the American Public Health Association in October, and would ask your opinion as to the possibility of my attending these meetings. Dr. Wilson, who has done a large share of the work, and with whom I have collaborated, wishes, with your permission, to be present in Montreal.

F. F. WESBROOK, M. D.,
Director.

Sept. 30, 1897.

During the months of July, August and September, contrary to anticipation, the work in this laboratory has increased in amount, and the compilation of work already done and the undertaking of new researches have not, as a consequence, been so satisfactory as would otherwise have been the case. What has been accomplished

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was only possible by the utilization of spare moments and by the working of the staff, official and voluntary, at times when such could not of right have been expected.

Matters requiring immediate investigation are coming to light daily, but the amount of work calls for a selection, and the slighting of some, with the present force and equipment, is imperative.

As illustrating some of these difficulties may be cited the fact that workers of experience, such as Dr. Fritz Baumann and Dr. J. Dice McLaren, who have been admitted to the laboratory in order to carry on research work along some chosen line, have been requested to undertake such tedious routine matters as the bacteriological examination of waters received for analysis. Such work has cheerfully been done by them hitherto, but it seems only right that this board should realize that it is under deep obligations to Drs. McDaniel, Baumann and McLaren for purely voluntary work, without which it would be impossible to operate the laboratory.

Dr. McDaniel since her official connection with the laboratory ceased has been of incalculable assistance in the routine work of which she has such an intimate knowledge. She and Dr. McLaren are both engaged in research work at the present time.

Mr. Geo. Gray and Miss Fosse, students, who were working in the laboratory during the summer, have left to undertake other duties, but Mr. Magee and Mr. Hare, who proved of such value during the last eight months of the year ending June 1, 1897, have returned.

Several applications of students in medicine, for positions as voluntary assistants, have been received, and appointments will be made when their fitness for the positions has been determined.

The financial embarrassment of the board makes it necessary that these many voluntary workers, occupied during part time, be employed to do the work which might be more satisfactorily and systematically done by fewer individuals whose whole time could be given to it.

The increasing work and workers demand more space and equipment, especially microscopes, but this time seems particularly inappropriate for doing more than calling attention to needs, present and future, in order that the board may provide a remedy, either in curtailing of routine duties or increasing equipment or staff.

The fear of an immediate increase in routine and other work seems justified in looking over the history of the laboratory and in taking into consideration the time of year.

The matter of an increase in the stipend of the workers in the laboratory, together with the possibility of securing the services of

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Dr. O. McDaniel, was laid before the executive committee of this board at a late meeting, and is now under consideration, pending the inquiry into ways and means.

In accordance with the permission of the board, granted at the last quarterly meeting, July 13th, the director and assistant bacteriologist attended the annual meeting of the British Medical Association, held at Montreal, August 31st to September 4th, where the appended papers were presented. (See page 56.)

TYPHOID FEVER.

The results of the investigations of the use of the serum test for the diagnosis of typhoid fever, in the late epidemic of the disease in Minneapolis, largely as embodied in the paper read before the British Medical Association, were presented on request to the Hennepin County Medical Association, on October 4th.

A discussion took place at that meeting concerning the purity of the water supply and causation of the disease.

The facts in regard to the finding of *B. typhi abdominalis* in the drinking water, and the application of the serum test in diagnosis, were alone brought forward by this laboratory.

The following is a synopsis of the examination of the dried blood of patients supposed to be suffering from typhoid fever:

Place.	July.	August.	Sept.	Total.
Minneapolis	166	273	256	695
St. Paul	2	6	1	9
Ft. Snelling	5	...	...	5
Kenyon	...	5	1	6
Duluth	...	2	3	5
Hibbing	1	...	1	2
Sauk Center	...	2	2	4
Elk River	1	...	...	1
Olivia	1	...	...	1
Renville	...	...	1	1
Royalton	...	...	1	1
	176	288	266	730

The great increase in this work is very apparent.

As the methods employed in the investigation of blood of typhoid fever patients, and its specific action upon *B. typhi abdominalis* in this laboratory, had necessarily to be of the simplest in order to ob-

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tain the coöperation of physicians and to prevent mistakes, it seemed wise to endeavor to improve them scientifically, without at the same time increasing the complexity of the technique from the clinician's standpoint.

Bearing these difficulties in mind, Dr. Wilson has succeeded in finding a technique which has thus far answered all conditions. A brief description of it is as follows:

A data blank, a small square of aluminum foil, and an aluminum wire about two inches long, upon which a loop is bent, are enclosed in an envelope upon which are the following directions:

"To secure a reliable reaction with dried blood it is necessary that a comparatively large amount be collected in as cleanly a manner as possible. Hence please observe carefully the following directions:

"Wash with boiled water the part from which the blood is to be obtained —(the lobe of the ear, end of finger, or toe in infant). Prick deeply the skin with a clean needle or scalpel. Remove four or five loopfuls of blood with the wire loop in outfit, placing each by itself on one end of the strip of aluminum foil enclosed. When the blood is dry, double the other end of the foil over the end upon which the blood has been placed, then fold over all the free edges so as to make a tight packet. Fill out the data blank *in full*, return it with the foil-packet and wire loop to its envelope; place this in a larger envelope and mail to the laboratory."

(Data Blank to accompany specimen for Typhoid Fever Examination.)

Date and hour of collection.....
Patient's Name ..... Address.....
Physician's Name ..... Address.....
Health Officer's Name .....Address .....
Has this case been reported upon before?..... If so, give former case No...
Patient's age ..... Sex ..... Temperature .....
How long since disease commenced? .....
What is the supposed source of infection? .....
When, if ever before, has patient had Typhoid fever?.....
Remarks .....
Physician's diagnosis ..... Do you desire telegraphic report?.....

The blood on reaching the laboratory in the dried condition is weighed on a fine balance, and measured quantities of sterile water or broth used to dissolve it, and in this way it is possible to estimate accurately in what strength the blood extracts are active in producing clumping and loss of motility in the culture of *B. typhi abdominalis* used.

The method appears to have very decided advantages for use under such conditions as obtain in a public health laboratory, being far less complicated and more accurate than any hitherto described.

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DIPHTHERIA.

The following is a synopsis of the diphtheria examinations for the last quarter:

Place.	July.	August.	Sept.	Total.
Minneapolis	30	33	45	109
Owatonna public school	131	99	125	355
Buffalo Lake	...	8	...	8
Butterfield	1	...	...	1
Brainerd	1	...	...	1
Brownsdale	2	...	...	2
Faribault	2	1	3	6
Farmington	...	...	4	4
Jordan	1	...	...	1
Lanesboro	...	...	2	2
Lake Benton	...	...	1	1
Luverne	1	...	1	2
Maple Lake	...	...	1	1
Minnesota Lake	...	1	...	1
Monticello	...	1	...	1
New Paynesville	...	...	1	1
Plainview	...	1	2	3
Red Wing	...	...	2	2
St James	...	...	1	1
Sleepy Eye	1	...	1	2
Spring Valley	...	1	...	1
Waverly	...	...	3	3
Wadena	...	...	7	7
Wykoff	...	...	1	1
Totals	169	147	199	515

It will be noted from the foregoing table that the usual autumnal increase of the disease has already begun. The examinations from the state public school at Owatonna show it to be no exception to the general rule. During the last quarter fifty guinea pigs have been inoculated with pure cultures from this source. The virulence of *B. diphtheriae* and its variant *B. Owatonnae*, even when obtained from throats of patients a long time free from clinical symptoms of the disease, has been satisfactorily shown.

It would seem desirable at the present meeting of the board to discuss the advisability of making bacteriological examinations the

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uniform criterion throughout the state for the establishment and maintenance of quarantine in diphtheria.

Such a ruling would appear to be warranted from a public health standpoint for the following reasons:

1. The lightness or severity of the clinical symptoms in any given case are not an index of the contagiousness of the case.

2. *B. diphtheriae* in about ninety-eight per cent (see New York Board of Health Report) of the throats in which it is present is virulent. It thus renders the patients probable foci of epidemics throughout their entire period of infection.

3. The inconvenience to the few, of holding in quarantine the rare cases in which the bacteria persists, for a long time after the subsidence of all clinical symptoms, would be more than offset by the safety of the many who might otherwise become infected.

4. Further, the period of infection in many cases has been shown to be considerably shorter than that usually accepted as the standard for the maintenance of quarantine, being occasionally as low as ten days.

To sum up: When *B. diphtheriae*, which are the only infecting agents in diphtheria, are present in the throat or nasal passages of an individual, that individual is a probable source of danger to others, and should be isolated until shown to be free from the bacilli.

For more detailed discussion, see pages.. and .. of the Montreal communication on diphtheria. Should this meet with the approval of the board, it would seem desirable that some suitable communication explanatory thereof be issued from the secretary's office.

Some suggestion is asked for as a remedy of the difficulty, arising from the fact that neither the request on the cover of the box for the transmission of diphtheria specimens nor a printed postal card will induce physicians to return unused boxes. At present the laboratory owns 300, and not more than seventy-five are in active circulation. This means a loss of at least fifteen cents in money for each, as well as a great deal of time. The use of an old, and possibly contaminated, tube of medium leads often to very great difficulty, and possible inaccuracy, in the examination, whilst delay is absolutely necessary.

WATER ANALYSIS.

Some investigations of the bacteriological and chemical constituents of samples of water sent in for analysis were made during the last three months.

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As yet no literature has been sent out, since very great dificulties are to be encountered in the obtaining of sufficient data relative to local conditions and methods employed, as well as in the collection and transmission of samples for bacteriological examination.

The issuing of printed information and instructions concerning the bacteriological and chemical examination of water had been postponed until after the meeting of the British Medical Association, at which a discussion on this subject was announced.

The subject was, however, not considered, and in informal conversation with bacteriologists and chemists the general opinion seemed to confirm the experience of this laboratory, that samples of water as ordinarily collected and forwarded by local health officers and physicians, even after most careful instruction had been furnished, were often either valueless or totally misleading.

It would appear, then, desirable that examinations be done only in most carefully selected instances, in which after a painstaking clinical and hygienic investigation, of which evidence should be furnished in writing by the health officer, some connection could reasonably be established between the water and the disease. It seems very difficult to convince those desiring investigations that from one to three weeks, or longer, must elapse before any conclusion can be arrived at, and that even then too much reliance cannot be placed upon a negative result.

Considering these difficulties it would appear well, after receiving all the proofs possible from the local authorities, that the disease was water-borne, to send some one from the laboratory to make a personal inspection and to collect specimens. Where evidence was seen of unusual aptitude for this kind of work on the part of those desiring investigation, this rule might be suspended.

EXAMINATIONS OF SPUTUM FOR B. TUBERCULOSIS.

During the last quarter twenty-nine examinations have been made. This subject is one which under existing circumstances, viz., where examinations are left to the discretion of the laboratory, gives the greatest opportunity for misunderstanding, and, it is to be feared, occasional ill feeling, notwithstanding the extreme care and courtesy used when refusing any particular case, in which it is very clear that the physician is imposing a work on the laboratory which is simply distasteful to him. At other times there is a continued refusal to comply with the conditions set forth in the "Circular of Information."

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Would it not be well, as the secretary is issuing blanks for the reporting to him of tuberculosis amongst infectious diseases, to send something in the nature of a circular in which, from a popular standpoint, the contagiousness of the disease, as well as precautions necessary for patients to take, were set forth, to every patient for whom an examination is made in the laboratory.

Physicians now are requested to give the names and the addresses of patients for whom examinations are asked, and they could not object to a board, whose sole aim is the preservation and improvement of public health, furnishing information to their patients of the nature of their disease. Of course, it would be necessary to notify health officers of this plan, and to give the reasons for such action. The discretionary power of the laboratory would be thus minimized.

Houses of patients for whom examinations had given positive results could be placarded with some form of notice, such as that adopted in New York City, in which people might be warned of the nature of the disease from which the occupant was, or had been, suffering.

The secretary of this board receives a copy of all diagnoses made, and could from these forward the necessary notices.

During the quarter just ended the following sundry examinations have been made:

Glanders	5
Verminous bronchitis in calves	1
Parasites in lambs	1

The possible agency of bacteria in the disease recognized as verminous bronchitis is now under investigation in the laboratory, having been made necessary by the conditions surrounding an outbreak of the disease, which will be reported on by Dr. Reynolds.

F. F. WESBROOK, M. D.,
Director.

December 31, 1897.

During the past quarter the routine work has increased, as might have been expected from the experience of last year. The size of the force not having been increased to meet the greater demands makes it difficult to cope with the routine work alone, and daily the

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opportunities which are afforded of exploring some new and promising field of research, of extreme value to this board, have been allowed to go by.

Notwithstanding this, by dint of using the most available materials and occasional moments left from the duties which have now come to be regarded as routine, and therefore demanding first attention, some time has been found for research.

RESEARCH WORK.

The interesting work done in connection with the diagnosis of rabies and typhoid fever has been partly presented, in accordance with the permission of this board, in two papers read before the American Public Health Association, held at Philadelphia in October, 1897, by officers of the bacteriological laboratory. The titles of the papers were: "A Preliminary Report on the Examination of Twenty Cases of Suspected Rabies" (see page 331), and "The Serum Diagnosis of Typhoid Fever from the Public Health Laboratory Point of View" (see page 301).

Other matters are not being neglected, and research is being prosecuted in connection with the following:

(a) The epidemic amongst calves, reported by Drs. Reynolds and Brimhall, which appeared to be somewhat similar to cases before described as "verminous bronchitis," has been under investigation for some months by Dr. J. Dice McLaren, professor of biology and bacteriology, at the South Dakota Experiment Station, Brookings, who has been working since last July in the laboratory, and to whom this board, at its last quarterly meeting, expressed its appreciation of work of a routine character so well and cheerfully done by him. This research upon the calves has involved a huge amount of work, both bacteriological and biological, and has as yet yielded nothing sufficiently constant of occurrence for a report to be made. Dr. McLaren has been compelled, on the expiration of his furlough, to return home, and has taken part of the materials with him with the intention of carrying his researches further. As opportunity arises here, parallel investigation will be continued.

(b) Dr. Wilson, senior assistant bacteriologist, has been obtaining very interesting results on flagella, and the means of easily demonstrating them and their relation to bacteria.

(c) He has also under investigation a highly instructive case of supposed rabies in the human subject, from the brain and medulla of which *B. diphtheriae* has been isolated, and proved to be path-

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ogenic. It may also be here noted that on two tests during the week before death, in the patient, a strong "typhoid reaction" was obtained. Two rabbits, inoculated subdurally from the brain, have developed symptoms which appear to be those characteristic of rabies, in nineteen and twenty days, respectively. There is still a very great deal to be done in the matter, and the present indications may not be verified. Dr. Wilson and Dr. G. Douglas Head of Minneapolis, in whose practice the case occurred, will collaborate in the investigation.

(d) Mr. Geo. Gray, a senior student in medicine in the University of Minnesota, is carrying on systematic tests of four kinds of apparatus of different makes, for disinfection with formaldehyde. This investigation was suggested by the discrepancies in the accounts of different investigators, both published and expressed in discussion at the meeting of the American Public Health Association. It seemed advisable, too, that this board, through observations in its laboratory, which should later be published, could, upon appeal, give some accurate information and advice to local boards and others requiring them.

Mr. Gray's experiences have been hitherto almost universally negative in regard to the efficacy of any of the methods, under conditions most favorable for their satisfactory operation, according to the instruction of the makers. He is endeavoring at present to find, if possible, some explanation of these results, which, though not unique and opposed to the experience of all previous observers, are sufficiently different from the maker's representations and from some published records as to require most careful verification.

(e) Further investigations upon rabies, and especially upon means of protection and a possible cure, are in progress. It is also the intention to proceed with the investigation of the use of the serum of immunized animals, both prophylactically and curatively, in the attempt to verify and extend the work done in Europe by Tizzoni, Centanni and Babes.

Previous experience has shown the desirability of having a fixed virus for purposes of comparison and experiment, and Dr. Keirle has kindly agreed to inoculate and send a rabbit from the Pasteur Institute at Baltimore, when a series can be continued. This plan saves more than a year, as a fixed virus cannot be obtained without a long series of passages, involving at least fifty generations of animals.

(f) The serum diagnosis of typhoid fever is still under investigation, and the large number of cases occurring in Minneapolis has afforded a very good opportunity for its study.

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(g) A quick and accurate method for the isolation of *B. typhi abdominalis* is more and more needed, and efforts have been and are being made towards solving the difficulties, but apparently hitherto without avail.

(h) Studies on the varied morphology and pathogensis of *B. diphtheriae* are being continued, and it may be mentioned that the conditions existing in the state public school at Owatonna offer excellent chances, which are not being allowed to go entirely unutilized, though this is so to a greater extent than should be the case.

THE STAFF AND WORKERS IN THE LABORATORY.

The personnel of the laboratory has been slightly changed. Dr. A. W. Miller, junior assistant bacteriologist, has resigned to accept the position of bacteriologist to the St. Paul health department. The vacancy created by his resignation has been filled temporarily by Dr. O. McDaniel, of whose capacity for efficient work the board has in the past had ample proof, and her appointment is here recommended.

Dr. McLaren has left to resume his duties at the University of South Dakota, to the regret of all the workers in the laboratory.

Messrs. Magee and Hare resumed their work in the laboratory upon the opening of the medical department of the university, in which they are second-year students. Mr. McLeod, another medical student, has volunteered to help in various ways, and his services are much appreciated. Mr. Gray is engaged in research work before mentioned. It is necessary to state that no more work can be undertaken than is now in progress with the present force, and that being done now cannot be continued without very serious interference with its quality and the satisfactory relations hitherto existing between the laboratory and those availing themselves of its services.

The time has arrived when a settled policy will have to be adopted in regard to the character and scope of the work in the laboratory. An endeavor has been made in all previous reports to obtain an expression of opinion on the matter, without, it must be confessed, much success.

Greater discrimination must be made in the making and reporting of diagnoses. The question of limiting the operation to those cases coming through local boards of health assumes a greater importance.

The limitation would cut off perhaps, in certain instances, opportunities for research and study of many interesting matters, and in this, and perhaps other respects, prove harmful.

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The possibility of securing some coöperation and financial assistance sufficient to secure the services of another person on the staff for full time, or of at least securing the full time of the junior assistant, at present working only part of the day, has been laid before the executive committee. At the request of this committee, first, the vice president, Dr. Hutchinson, and later, the director of the laboratory, consulted with Dr. Avery, commissioner of health of Minneapolis, in regard to the matter. This committee will, it is hoped, have something to report at this meeting.

The question of decreasing the work, or increasing the staff so as to be able to cope with it, involves the necessity of some changes in the printed information, relative to the work of the laboratory, already in circulation.

Certain improvements in methods, and the desirability of emphasizing certain points, or introduction of new instructions where experience has shown them necessary, would seem to demand a new circular of information.

The proposed changes, questions of policy, and such matters have all been referred to the executive committee, which will doubtless be prepared to report.

Owing to financial embarrassment preventing the issuance of bulletins and circulars, it was deemed advisable to order at least 500 reprints of each of the four papers read from the laboratory, and dealing with its work for the last half year, and it is proposed, under the headings dealing with these subjects in a new circular of information, to state that, upon request, the papers will be forwarded purely as an educational matter, since a circular of information is not the place to give in detail results of observation or methods other than those necessary for the securing of the proper collection and transmission of specimens and an idea of the time necessary for and the interpretation to be placed upon diagnoses.

The following is a table of the examinations made in the laboratory for each quarter of the last year, showing the relation of the amounts for each month, as well as the total number of those done in 1896.

It must be remembered that, in each case of rabies examined, from two to twenty-one rabbits have been inoculated and kept under observation for a period of two to six months. In all the cases of rabies to date rabbits have been used. Likewise water examinations require work every day for a period of ten days to two months, or longer. The examination of materials, tissues, etc., from cases of unknown or undiagnosed diseases of man or animals requires a

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time all out of proportion to the results achieved, so that it is difficult to estimate the amount of work done in other examinations than those for diphtheria and typhoid fever (blood).

Examinations.	Quarters, 1897. First.	Second.	Third.	Fourth.	Total, 1897.	Total, 1896.	Total, '96, '97.
Diphtheria	565	448	515	879	2,407	923	3,330
Typhoid	394	465	728	821	2,408	62	2,470
Tubercle	40	47	29	25	141	84	225
Water	8	3	15	3	29	9	38
Glanders	4	6	5	1	16	.....	16
Anthrax	5	2	.....	1	8	.....	8
Swine plague	.....	.....	.....	.....	.....	1	1
Hog cholera	1	6	2	.....	9	1	10
Rabies	8	4	5	4	21	3	24
Verm. bronchitis	.....	.....	3	.....	3	.....	3
Parasites in lambs	.....	.....	1	.....	1	.....	1
Infectious diseases of fowls	.....	.....	.....	1	1	.....	1
Rabbit inoculations	38	39	50	22	149	13	162
Guinea pig inoc'tions	13	45	56	12	126	.....	126
Rat inoculations	.....	1	3	.....	4	.....	4
Mouse inoculations	.....	1	1	.....	2	.....	2
Dog inoculations	.....	.....	.....	.....	4	.....	4
Sundry examinations	4	5	1	3	13	2	15
Totals	1,080	1,072	1,418	1,772	5,342	1,098	6,440

SYNOPSIS OF DIPHTHERIA EXAMINATIONS FOR OCTOBER, NOVEMBER, DECEMBER, 1897.

Place.	October.	November.	December.	Total.
Adrian	...	...	1	1
Austin	...	1	2	3
Belview	2	11	...	13
Blooming Prairie	...	...	1	1
Brainerd	1	...	4	5
Brownsville	1	...	...	1
Chaska	...	2	1	3
Cromwell	9	10	...	19
Eagle Bend	...	...	3	3
Elk River	...	...	2	2
Fargo, N. D.	...	2	...	2
Faribault	2	5	11	18
Farmington	1	...	...	1
Grand Forks, N. D.	2	...	...	2
Jordan	...	...	1	1

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Lake City	2	3	1	6
Little Falls	1	...	...	1
Long Prairie	3	...	...	3
Luverne	1	...	...	1
Lyle	1	1	...	2
Mabel	2	1	...	3
Maple Lake	2	...	...	2
Mazeppa	...	...	1	1
Millville	...	1	1	2
Minneapolis	77	98	93	268
Minnesota Lake	...	10	9	19
Monticello	...	1	...	1
New London	1	...	...	1
Northfield	...	3	...	3
Osakis	...	1	...	1
Owatonna	...	1	...	1
Owatonna State Public School	51	155	223	429
Perham	...	...	2	2
Pine City	...	...	1	1
Plainview	...	1	...	1
Red Wing	1	4	...	5
St. Cloud	...	...	2	2
St. James	1	3	...	4
St. Paul	2	4	4	10
Shakopee	1	...	...	1
Spring Valley	...	2	...	2
Wabasha	2	...	...	2
Wadena	10	5	7	22
Willmar	...	1	1	2
Winona	1	1	1	3
Wykoff	...	1	...	1
Zumbrota	...	2	...	2
Total	177	330	372	879

As will be seen from the above table, the bacteriological examination of diphtheria is being utilized in a greater number of places than ever before.

In the table, in most instances where one or two examinations only are reported from a place, the diagnoses given have been "Not diphtheria."

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On the other hand, it sometimes occurs that after a positive diagnosis has been sent, and with it "Special Notice, No. 1," of which for reference a copy is here appended, no further specimens are sent.

SPECIAL NOTICE, NO. 1.

January 15, 1897.

When a diagnosis of diphtheria is given, it is requested, that, on the disappearance of clinical symptoms and before quarantine is raised, second specimens be sent in from all such cases, in order to determine how long the *bacillus diphtheriae* remains in the throat.

It is plainly apparent that so long as the bacilli are present the patient, unless quarantined, may be a source of danger to others.

To know definitely of the presence or absence of this danger is of the utmost value to the physician in enabling him to determine the necessity of quarantine.

Where the second examination still shows the bacilli present, quarantine should be rigidly maintained and specimens sent in until bacteriological examination shows the throat to be clear.

It is not to be supposed that between the time of the sending of the specimen and the receipt of the report, the patient is not to be regarded as possibly dangerous to public health.

F. F. WESBROOK,
Director.

Letters, too, are often written, pointing out the precautions necessary to secure satisfactory results, and offering to make as many examinations as are desired.

A suggestion worthy of some consideration, if it would not involve the throwing of too much work upon the secretary, is that he might write or send some official recommendations, concerning the desirability of the use of the bacteriological diagnosis, to serve as a criterion for release from quarantine, to every health officer in whose district diphtheria has been diagnosed by the laboratory.

Copies of all diagnoses made are sent to the secretary, and, by doing this, the recommendation concerning quarantine comes from the proper source (executive officer), and the laboratory responsibilities, already too numerous, are lightened to some extent.

The secretary has in the past recommended the method in all cases in which the knowledge has come to him through correspondence or other sources. It would seem that the board should take a firmer position, and recognize no other method than the bacteriological for diagnosing the presence of diphtheria, and that boards of health should be urged to adopt its use exclusively. Some better method than the above suggestion is possibly to be arrived at, such

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as the issuing of a conjoint bulletin from the secretary's office and the laboratory. The city of Minneapolis has officially adopted this method during the last quarter.

In reference to the work at Owatonna, whose magnitude is seen to be not diminishing, it may be said that the large number of examinations recorded has been due to the fact that the medical officer has been again going systematically through the cottages and removing all inmates in whose throats were found *B. diphtheriae* to an isolated ward.

Where such conditions exist as are present in this public school it would seem that most vigorous methods are demanded, and the necessity of utilizing the recommendations made in the communication entitled, "Diphtheria and Its Variants, where Diphtheria is Endemic," are made more apparent by further study. (See page 319.)

It is a matter of great importance, and one in which the possibility exists of obtaining accurate knowledge upon many points at present in more or less obscurity.

SYNOPSIS OF TYPHOID BLOOD EXAMINATIONS.

Place.	October.	November.	December.	Total.
Minneapolis	270	250	266	786
St. Paul	4	1	2	7
Duluth	2	2	4	8
Hibbing	1	...	...	1
Dodge Center	3	1	...	4
Winona	1	...	...	1
St. Charles	1	...	...	1
Crookston	1	...	...	1
New Ulm	3	...	...	3
Monticello	1	2	...	3
Lake City	...	1	...	1
Wykoff	...	...	4	4
Ft. Snelling	...	...	1	1
Total	287	257	277	821

The above examinations are merely those which have been done as daily routine for diagnosis, and concerning which reports are sent to physicians. Several hundred other examinations, for the determination of the length of time after recovery in which the reaction

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is to be found, and for the reaction, if any, existing between temperature and intensity of reaction, have been made.

The paper on the reaction, read at the American Public Health Association, to which reference has already been made, contained the report upon and summary of the examinations in 1,019 cases of suspected typhoid fever, which had been made up to Oct. 21, 1897. (This is the largest number of examinations reported from any one source up to that date.)

A strong plea was made in the communication for the utilization of this method, in the absence of a quick and accurate method of demonstrating *B. typhi abdominalis* itself, as a guide to the employment of preventive measures by local health officers.

The method devised by Dr. Wilson, to which reference was made in the last quarterly report, was fully explained.

Although this method, even with its later improvements, involves much greater labor, in view of the accuracy, seemingly not otherwise to be obtained, it has been employed entirely during the last quarter.

RABIES.

Material has been received from four cases during the quarter, one human, one in horse and two in dogs.

The case of the horse is deserving of some mention. The head of the animal was brought in by Dr. Reynolds, and received at the laboratory Oct. 18, 1897. The horse had developed symptoms of rabies some three or four months after a history of an unprovoked bite by a stray dog.

Two rabbits inoculated with an emulsion of the brain died in thirteen and twenty-four days, respectively. The former animal showed post mortem a number of coccidium colonies in the liver, which might account for the rather too short incubation period. A diagnosis of rabies was given. No rabbits being available at the time, further inoculations were impossible, and seemed unnecessary. The case in the human subject has been previously mentioned, and is still under investigation.

There have been during the past year twenty-one cases investigated, and three carried forward from the previous year. As far as the work has been sufficiently completed, positive diagnoses have been given in seventeen, which shows the comparatively frequent occurrence of a disease, until recently unnoticed in this state.

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EXAMINATION OF SPUTUM FOR TUBERCULOSIS.

Twenty-five have been made during this quarter. This shows a decrease commensurate with the exercise of that discretionary power given the laboratory. It would seem well to remove that power, as the statement made in the most conciliatory manner "that the routine work of the laboratory does not include anything other than examinations calculated to give the local health board data upon which to take steps to protect the public health, and the investigation of new methods and obscure matters, in the opinion of the laboratory important," seems usually to have one of two effects, viz., causes annoyance to the physician, or seems to increase his desire to use the laboratory as a consulting clinical laboratory, established by the state for his private convenience.

It would appear well to consider at this point the desirability of doing all the work which comes in, promptly, and of sending to the local health officer a copy of the diagnosis, as is now done, and to the patient a copy of the diagnosis and a circular suggesting the proper steps to protect others brought into contact with him. The elaboration of some such plan as proposed in the laboratory's last quarterly report, and in use in New York City, is to be desired. This would mean, of course, that the present force should be doubled.

WATER EXAMINATIONS.

Three have been made during the past quarter. With the exception, perhaps, of one examination for Minneapolis water, in which *B. typhi abdominalis* was found, the rest of the twenty-nine examinations done during the year, have been for the most part valueless.

It would appear advisable in a new issue of the circular of information to insist upon the health officer for any district furnishing all clinical and other data connecting a water supply with cases of disease, and details as to situation of supply, slope of rock, possible contaminating sources, nature of soil, etc., in writing to the laboratory. This evidence should be carefully considered, and if of sufficient importance to warrant it, a bacteriologist could be sent out from the laboratory to obtain additional data, with the help of the health officer, and collect samples in a proper manner. Water analyses will mean something accurate and be of value then, and not before. The time taken in such examinations is enormous, and may be considered as wasted, unless the samples are properly collected, as can only be done by a trained bacteriologist and the data absolutely correct.

F. F. WESBROOK, M. D.,
Director.

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March 31, 1898.

Some diminution in the routine work done in the laboratory during the last quarter might have been expected, owing to the establishment of a bacteriological laboratory by the city of Minneapolis, for which the state board of health laboratory has, since its commencement, made all examinations. (For a history of the cessation of the making of bacteriological examinations by this board, see report of executive committee, upon whose authority such action was based.)

Since February 10th no examinations for the presence of *B. diphtheriae* have been made for Minneapolis. Notwithstanding this, this work has increased. (See table.) All examinations of blood for the typhoid reaction, and other work of a research character, have been continued as heretofore, the only difference in the routine being that no copy of the result of laboratory findings has been furnished the local health officer. Considerable time has thus been saved.

Some idea of the work done in the laboratory during the years 1896 and 1897 for Minneapolis and its relation to the work done for the whole state may be obtained from the following table, which was submitted to the Minneapolis board of health Jan. 10, 1898:

COMPARISON OF WORK DONE FOR MINNEAPOLIS WITH TOTAL FOR STATE.

Examinations.	Total for State, 1896.	Minneapolis, 1896.	Total for State, 1897.	Minneapolis, 1897.
Diphtheria	923	290	2,407	690
Typhoid fever	62	57	2,408	2,302
Tuberculosis	84	35	141	88
Water	9	2	29	3
Rabies	3	...	21	4
Anthrax	.....	...	8	2
Glanders	.....	...	16	4
Sundry examinations	2	2	27	7
Animal inoculations	13	...	285	50
Total	1,098	386	5,342	3,150

(For an account of examinations made, see tables and reports under headings "Diphtheria," "Typhoid Fever," "Rabies," "Tubercle," "Glanders," "Water Examinations," etc.)

The personnel of the laboratory has remained unchanged.

The research work of which a synopsis was given in the last report, has progressed steadily along the lines indicated. No one in-

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vestigation has been entirely completed, though it is hoped that final reports may be made upon some of the following:

(a) In the case simulating rabies in man, in which *B. diphtheriae* was isolated from the brain, Dr. Wilson has succeeded in proving the micro-organism isolated to be culturally and pathogenically *B. diphtheriae.* Animals are protected against fatal doses of the microbe, subcutaneously or subdurally given, by previous or synchronous doses of diphtheria antitoxine. The last and most conclusive proof has been the immunization of a large rabbit by repeated gradually increasing inoculations of, first, filtered cultures, and, later, living cultures of the microbes. The blood serum of this rabbit has been shown to have acquired the capacity to protect other animals against a virulent culture of *B. diphtheriae,* isolated from a case of clinical diphtheria.

Furthermore, experiments with subdural inoculations of pure cultures of this micro-organism have in one case, after a small dose, produced symptoms not to be differentiated from those of true rabies, as evinced in animals showing symptoms at the same time, and which had been inoculated with *virus fixe,* and with virus from the wolf at Cannon Falls. The post mortem findings were rather different, however, showing some considerable degeneration at the seat of inoculation. Considerable difficulty was met with in determining the dose necessary to produce symptoms like those of rabies, as in most cases death took place in under four days, or the rabbit survived (invariably according to the size of dose).

In the one animal in which pure cultures produced rabies symptoms they appeared in twenty-three days, death occurring on the twenty-seventh day. The rabbit had, on the eighth day, shown evidence of acute meningitis, and rushed hither and thither, striking against any object in its way. It recovered temporarily by the end of the eleventh day.

The original animals inoculated from the human brain, and a second series inoculated from their medullæ, developed symptoms like rabies, and died in nineteen to twenty-three days. Other rabbits of the same size, inoculated in the same manner, at the same time, and with the same or larger doses of the same material, but receiving also subcutaneously protective doses of diphtheria antitoxine, are still alive and well, having shown no symptoms ninety days after inoculation. On the completion of this series of two sets no more inoculations were made, and the pure cultures of *B. diphtheriae,* isolated from all but one of the animals, were continued through several generations, on serum and other artificial media, which cultivation seemed to increase their virulence.

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An attempt is being made to reproduce exactly the same pathogenic effects by a process of educating the microbe, now carried through these many generations, and other cultures of *B. diphtheriae* isolated from other sources, to grow in the nervous system, so that inoculations of the medullae of rabbits will produce symptoms of rabies and death, as was the case in the original inoculations carried out with the human brain, and subsequently with rabbits.

Prof. W. H. Welch, editor of the "Journal of Experimental Medicine," has kindly offered to publish this work in the form of a paper, and the permission of the board for such publication is hereby asked.

(b) The experiments of disinfection by means of formaldehyde, with various apparatus, conducted in the bacteriological laboratories of the state board of health and the University of Minnesota by Mr. George Gray, have yielded nearly uniform results, which are now undergoing tabulation and detailed arrangement. The apparatus known as the "Trillat Autoclave" has seemed to give, thus far, the most satisfactory results, though nothing more than a surface disinfection can be secured by any form of apparatus yet tested. In one room, in which the walls are all hard finished and painted, surface disinfection and even penetration of two thicknesses of canton flannel, and the killing of *B. anthracis*, *B. diphtheriae* and *B. prodigiosus*, dried on bits of silk, cotton or wool, in various parts of the room, have been effected fairly constantly. On the other hand, in a room in which the finishing is in rough plaster (floor walls and ceiling), under no circumstances, in many trials, could any constancy of destruction even in surface disinfection (cultures dried on cover slips, cotton, silk or wool, and freely exposed) be securel, whilst penetration of two thicknesses of cloth has never been obtained. Variations with very dry and with very moist air, and with different amounts of material used, and also in accordance with the specific personal directions of Mr. Fries, a member of the firm which manufactures the Trillat Autoclave, who visited Minneapolis recently, have failed to secure results in this room. None of the apparatuses succeeded. The porosity of the walls may be an explanation. For days after the experiments, particularly when the air was dampened by throwing water on the floor, a strong odor of the formaldehyde was discernible.

(c) The comparison and relation (if any) of the two forms of *B. diphtheriae* met with at Owatonna is under investigation still. It may be mentioned that the so-called (in this laboratory) "atypical" form, which is met with as the sole diphtheria-like organism, or

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mixed or alternating with "typical" form of *B. diphtheriae* in Owatonna, and which had been encountered until recently only once outside of the public school, has been found twice within the past few weeks from other parts of the state. The organisms in pure culture have been preserved for careful study. The suggestion is here made, that, during the next quarter, one of the staff of the laboratory be stationed at Owatonna for two or three weeks, or as long as seems necessary, with the requisite apparatus to carry out the work already commenced, for determining whether the prolonged presence of "typical" or "atypical" forms of *B. diphtheriae* in the throats, without causing symptoms, produces an antitoxic condition of the blood or not.

(d) Through the courtesy and kindness of the New York City board of health the laboratory has now a fixed virus of rabies, which was originally obtained from Baltimore. This is being employed for comparative study, along with some obtained from specimens sent to the laboratory for diagnosis.

The necessity for a "Circular of Information, No. 2," to supplement and on many points replace "Circular of Information, No. 1," is becoming daily more apparent. A copy of such a circular has been submitted to the executive committee, which will doubtless be prepared to report upon it.

Attention is invited to certain important matters therein set forth:

1. Owing to a new ruling of the postmaster general (see General Order, No. 677), dated Dec. 27, 1897, the method of sending specimens by mail is very specifically set forth, and the present arrangements for the diagnosis of diphtheria must be immediately altered, since diphtheria specimens are most often sent by post, although care was taken in the issuing of directions to omit the suggestion of utilizing the mails for their transmission.

In forwarding the boxes for such transmission of specimens from the laboratory the mails can be used, because as yet they do not contain pathological specimens, but the physician who returns them in the same way is liable to prosecution.

In the past expostulation from the laboratory on careless methods of transmission of specimens by mail has sometimes offended physicians, notwithstanding certain general directions and cautions in "Circular of Information, No. 1," and it is desired to make directions so specific and to afford such suitable means for transmission that the laboratory may not tacitly suggest infringement of a regulation calculated to protect public health, as is the case where the box used does not meet the requirements.

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Communication is in progress with the postmaster general and manufacturers of receptacles which have been officially accepted, and it is hoped that a sample outfit, with proposed directions for use and approximate cost of same, may be submitted to the board at this meeting. The inability to obtain definite information concerning this matter has caused considerable delay in the completion of the "Circular of Information, No. 2."

2. It would seem advisable to test some of the various methods of disinfection ordinarily employed by local health boards throughout the state, with a view of obtaining some data as to, (a) which are most successful, and (b) which are most practical. Dr. Wyatt Johnson, bacteriologist of the provincial board of health of Quebec, has been for about a year engaged in work of this kind, and he has been consulted as to methods employed by him, and results obtained.

It is proposed to make up small packets, containing harmless, easily identified bacteria, which will be sent out on request to local health officers, to be placed in rooms which are to be disinfected, and which will be returned to the laboratory, and their capacity for growth determined. A blank to contain particulars, as to size, arrangements and furniture of room, the nature of walls, floors, etc., tightness of windows and doors, presence of ventilators, cracks, etc., the kind and amount of disinfectant and nature of apparatus used, situation of the test packets (relative to disinfectors, whether freely exposed or wrapped in bedding, garments, etc.), and all details calculated to influence the process, will be furnished the health officer. It is hoped, that, without much increase in the routine work of the laboratory, reports could be forwarded in two or three days at the outside, and much valuable information acquired.

3. The introductory portion of the circular, in detailing the character of the work which the laboratory is prepared to do, may be said, in a certain measure, to be defining the policy of the board in regard to its laboratory, and deserves therefore some consideration.

4. The same may be said of the paragraphs on "Tuberculosis," "Water Examinations," and the investigation of the animal diseases.

SYNOPSIS OF DIPHTHERIA EXAMINATIONS—1898.

Place.	January.	February.	March.	Total.
Atwater	...	...	1	1
Austin	...	3	...	3
Belview	2	2	...	4
Blooming Prairie	2	...	...	2
Brainerd	2	9	2	13
Butterfield	1	2	...	3

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Dakota	1	...	...	1
Dassel	3	...	...	3
Elgin	1	...	...	1
Enderlin (N. D.)	1	...	...	1
Fairfax	3	...	...	3
Faribault	5	...	1	6
Farmington	...	...	1	1
Gibbon	...	1	...	1
Glencoe	...	...	1	1
Granite Falls	...	1	...	1
Henning	...	1	1	2
Janesville	1	...	...	1
Jordan	4	3	...	7
Kenyon	3	...	...	3
Lake City	3	...	1	4
Lanesboro	3	6	...	9
Luverne	...	...	1	1
Lyle	...	...	1	1
Maple Lake	...	2	...	2
Mapleton	...	1	...	1
Millville	1	...	...	1
Minneapolis	111	44	3	158
Minnesota Lake	1	...	...	1
Monticello	...	...	1	1
Moorhead	...	...	1	1
Northfield	1	...	...	1
Osakis	...	...	1	1
Owatonna (state public school)	258	183	148	589
Owatonna (town)	2	...	...	2
Plainview	...	...	1	1
Redwood Falls	...	3	...	3
Red Wing	1	...	...	1
Rothsay	...	1	...	1
St. Cloud	1	...	...	1
St. James	1	5	4	10
St. Paul	...	1	...	1
Tracy	...	4	17	21
Verndale	...	6	...	6
Wabasha	1	...	...	1
Wadena	13	13	1	27
Willmar	4	1	...	5
Total	430	292	187	909

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The above table shows the diphtheria examinations made for the quarter. Notwithstanding the fact, that, since February 10th, no routine examinations have been made for the city of Minneapolis, the number of examinations in this disease is greater than for any previous quarter since the establishment of the laboratory. As will be seen, however, the examinations made for Owatonna state public school have constituted a large portion of this work. The attending physician, Dr. J. H. Adair, on a recent visit to the laboratory, stated that all the cottages which he had investigated systematically by means of throat smears, the cultures from which were examined in this laboratory, were found free of infection, except the infant cottage. All inmates were removed to the quarantine and general hospital, both of which have to be used in detention of new arrivals and so-called culture cases of diphtheria. The bacilli have been by this means limited to these two places; a distinct gain.

There is almost a total absence, even in these places, of clinical diphtheria, though cases occasionally develop in those in whose throats diphtheria bacilli have been found for some time. Isolation, with plenty of fresh air, in tents, will be resumed on the appearance of warm weather, when it is hoped that the bacilli may disappear.

The prolonged persistence of this bacillus in throats, in spite of treatment, especially where a number of patients have to be confined together, makes this a more complicated matter, and until more ample provision is made at the school for detention of new arrivals and isolation of patients in whose throats *B. diphtheriae* is found, disinfection and renovation will probably be of very little use.

It may be mentioned that a specimen, taken March 30th, 1898, from the throat of Henry Hill (the patient whose throat had contained diphtheria bacilli since Feb. 14, 1897), showed no diphtheria bacilli present. Other specimens will be examined, since it is possible that the bacteria may have been missed in taking or examining the specimen.

SYNOPSIS OF TYPHOID BLOOD EXAMINATIONS—1898.

Place.	January.	February.	March.	Total.
Minneapolis	168	68	199	436
Fort Snelling	2	3	...	5
Morgan	1	..	...	1
Hibbing	1	..	1	2
Duluth	3	6	1	10
St. Paul	3	..	...	3

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Monticello	1	..	...	1
Stillwater	2	..	...	2
Kenyon	1	3	...	4
Wykoff	...	1	...	1
Lake City	...	3	...	3
Butterfield	...	1	...	1
New Ulm	2	..	...	2
Winona	1	..	..	1
Total	185	86	201	472

It wil lbe noted from the above table, covering the typhoid blood examinations for the past quarter, that a large proportion of the specimens are from Minneapolis. Many of these have been collected by Dr. J. P. Barber, who is making a study, in collaboration with the laboratory, of the clinical phenomena, urine examinations, etc., of his patients, as relates to presence and degree of intensity of the serum reaction.

A large amount of data has accumulated in this work since the last scientific report thereon from the laboratory and as soon as time will permit it will be arranged for publication.

SUMMARY OF SUNDRY EXAMINATIONS—1898.

Place.	January.	February.	March.	Total.
Tubercle	17	...	12	29
Rabies	2	2	2	6
Water	1	...	...	1
Glanders	2	1	...	3
Actinomycocis	1	2	...	3
Ptomaine Poisoning	...	...	1	1
Total	23	5	15	43

TUBERCULOSIS.

The examinations of sputum have been more numerous than during the last preceding quarter. The action of the board at its January meeting, in relation to these examinations, has been embodied in the new "Circular of Information," and it is hoped that the publication of the same will put the matter on its proper footing. In the meantime all specimens received have been examined, as it is found that the refusal to do examinations is taken as a personal matter, in the absence of any specific printed information on the subject.

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RABIES.

Six cases have been investigated during the past quarter, as follows:

A. The head of a dog was received on January 14th, from Dr. Sullivan, health officer of Adrian, which had been sent by express on January 12th. The animal, a stranger, had appeared on January 11th, and attacked other dogs and several people, one of which only, a child, was bitten through the clothing. The dog was killed January 12th. No further history of the animal could be obtained.

Subdural inoculation into two rabbits, on January 15th, produced typical symptoms of rabies and death in fifteen and seventeen days. Post mortem findings negative, as usual. A diagnosis of rabies was given.

B. The head of a cow, which had exhibited violent symptoms for three days prior to being killed, was received on January 20th, from the same source as A. The symptoms were at first attributed to a threatened abortion. The head was shipped by freight on January 17th. Notwithstanding the delay of three days in transmission, subdural inoculations into rabbits produced the usual symptoms of rabies and death in eighteen days in both animals. The post mortem findings corroborating the symptoms, a diagnosis of rabies was given on February 3d.

C. The material for this case (the head of a wolf) came from Dr. H. E. Conley, H. O., Cannon Falls, on February 14th. The animal had attacked several and bitten three people, as well as some dogs. Inoculations were given to two rabbits in the usual way, and symptoms of rabies developed on the thirteenth and fourteenth days respectively. Death took place in fourteen and fifteen days from inoculation. This period of incubation is the shortest yet observed in any inoculations made directly from a rabid animal (street rabies) in this laboratory, and the series has been continued in the endeavor to secure a fixed virus, and for experimental purposes. A diagnosis of rabies was given by telegraph, on February 27th. The people bitten were sent to the Pasteur Institute of Chicago for treatment.

D. A large mongrel dog, ordinarily quiet and affectionate, which had suddenly developed great ferocity, and attacked and bitten about fifty dogs, was shot, and the head forwarded to the laboratory, by Dr. D. M. Cool, H. O., Faribault, on February 18th. Immediately on receipt of the head, on February 19th, a pair of rabbits was inoculated, as usual, which developed symptoms of rabies in thirteen and fourteen days, and died in fourteen and fifteen days respectively. A diagnosis of rabies was given on March 5th.

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E. Dr. J. M. Rains, H. O., of Willmar, forwarded the head of a bulldog, on March 13th, which arrived on March 14th. The dog, along with several others had been bitten by a frenzied dog three days before. The bulldog, when bitten, was tied up, became sick next day (symptoms not specified), next day violent, and the following day was shot. Inoculations killed three rabbits in twenty-four hours. From their meninges, which were greatly congested, cultures of staphylococci and streptococci were obtained, which corresponded with cultures made directly from the dog's medulla.

The short period of incubation in the dog, as also in the rabbits, and the bacteriological findings, were suggestive of a septicaemic meningitis. As opportunity had, however. been afforded of contamination of the dog's brain during transit, no diagnosis was given, and further specimens were asked for.

Three dogs, a horse and a cow, showed similar symptoms about the same time. Only one of the dogs was known to have been bitten by the dog which bit Case E. All other animals appear to have been killed (about thirty) at the owners' requests, or failed to show symptoms, so that no further material could be obtained.

The interpretation given to the final letter written, in which meningitis was suggested, seems to have been, by the local paper, that the symptoms were due to meningitis, and not to rabies, although in a previous communication to the health officer it was suggested that both the animal, which bit Case E, and Case E may have had rabies, both having been bitten some time before.

F. The health officer at Willmar being unable to send any further material from those animals known to have been bitten on or about March 10th, requested the authorities at Raymond, fourteen miles from Willmar, to send in the head of a dog which developed symptoms supposed to be those of rabies, and which was killed March 19th. The head was received March 22d, and inoculations made. No symptoms have yet appeared in the rabbits.

The local health officers have, in all cases, employed most prompt and effective measures in dealing with the matter, and are deserving of great credit. The experience of the past few months is showing the prevalence of a supposedly rare disease in this state.

GLANDERS.

Three cases have been under investigation during the last quarter, and the results obtained have not been without a certain interest, and perhaps practical, if not commercial, value.

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In one case, No. 9, the materials (portion of lung, submaxillary glands, etc.) were received in glycerine, and it was expected that a micro-organism so easily affected by germicides as *B. mallei* would not grow, but contrary to this anticipation, the micro-organism was isolated in pure culture, and was found in addition to be fully virulent, and to produce the typical lesion of the testicles when inoculated into the peritonea of male guinea pigs.

Parallel experiments were made with cultures from another case, of which the material was furnished by Dr. Brimhall, as well as with cultures kindly furnished by Dr. Reed, of the Army Medical Museum, Washington, D. C. The results obtained with all cultures agreed perfectly, from a morphological, cultural and pathogenic standpoint, and verified the reaction of the horse, from which the material came, to the "mallein test," to which exception had been taken on post mortem examination.

These encouraging results have led to the hope that the laboratory may be of value to the veterinary department in confirming their diagnoses, when protests are made on account of the failure of the autopsy to demonstrate typical lesions, providing the specimens have been properly collected and forwarded.

ACTINOMYCOSIS.

Material from three supposed cases of this disease has been received for examination, and is now under investigation. In one of them (a bull), solid, calcareous nodules filled the whole of one testicle and a large part of the portions of both liver and lung, received. All three organs showed the presence of tuberculosis, but no actinomycocis. In the tubercles in the liver, besides tubercle bacilli, there were found present great numbers of coccidia, of a species not yet identified. This somewhat unique finding is the reason for mentioning the case here.

The case of supposed ptomaine poisoning, noted in the preceding table, deserves some attention, and the correspondence relating to the case is herewith given.

Exhibit A—Letter from Aug. Miller, March ——.

Exhibit B—Letter to Aug. Miller, March 25, 1898.

Exhibit C—Letter to Dr. Bracken, March 25, 1898.

Exhibit D—Letter from Aug. Miller, March 30, 1898.

The history of this case is a strong argument for the policy of the laboratory, in refusing to begin examinations until all obtainable information is received from the proper authorities. Here, in view of

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the nature of the supposed infection and the perishable character of the specimens sent, it seemed necessary to begin the investigation without waiting for the arrival of detailed information from physicians. As a result, after several days' labor were expended by the laboratory, the person requesting the examination wishes to "drop the whole matter."

F. F. WESBROOK, M. D.,
Director.

June 30, 1898.

During the quarter just closed the number of routine examinations for diagnostic purposes in this laboratory has been less than in any other quarter since the corresponding one for last year. This has been due, in some measure, to the restrictions on sputum examinations, but more particularly to the decrease in the local epidemic of typhoid fever, and consequent reduction of the number of specimens. The number of examinations for diphtheria is somewhat in advance of both the second and third quarters of last year, though at that time examinations were being made for the city of Minneapolis. This does not appear to be due to an increase in the number of cases reported, but rather to the fact that more physicians and health officers are adopting the bacteriological report as their criterion for the maintenance of quarantine.

About the first of May, the director of the laboratory became ill with typhoid fever, and is not yet able to resume his duties. This has necessitated the abandoning for a time of some of the pieces of special investigation work. During the quarter, however, the experimental work on the case of supposed rabies in which the diphtheria bacillus was isolated from the central nervous system has been completed and the report on the case written.

Two minor papers based on the work in the laboratory have been presented during the quarter. The first of these, "Notes on the Widal Reaction," was read before the Minneapolis Medical Club, May 19, 1898, and the second, "Elements of Error in Interpreting the Widal Reaction in Typhoid Fever," was read before the section of medicine of the State Medical Society, June 15, 1898. (See page 313.)

The studies on the morphology of *bacillus diphtheriae* and its variants are still in progress. It may be here remarked that the case of long persistence of the bacilli in the throat of the child at the

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state public school still continues, the germs being found present in a specimen taken June 25th.

The experiments on the subdural inoculation in rabbits of pathogenic bacteria have been laid aside for the present on account of lack of time and lack of animals.

The following changes have occurred in the laboratory force: On May 14th Mr. Moorhead, clerk, left to accept a position in a law office and Miss Olive Bishop was engaged in his place. On May 21st Harry M. Charleston, janitor, was discharged (for refusal to obey instructions), and Wilfred O'Brien engaged in his place. On June 6th, on the recommendation of the executive committee, Mr. Henry Condit was engaged as special assistant for two months, at a salary of fifty dollars per month.

It is hereby requested that the foregoing temporary appointments be confirmed by the board.

SYNOPSIS OF DIPHTHERIA EXAMINATIONS, SECOND QUARTER, 1898.

Place.	April.	May.	June.	Total.
Ada	...	1	...	1
Adrian	...	1	...	1
Argyle	...	2	...	2
Anoka	...	3	1	4
Delavan	...	...	1	1
Farmington	2	...	...	2
Fargo, N. D.	...	...	3	3
Faribault	1	6	3	10
Granada	...	1	...	1
Jordan	...	...	1	1
Lanesboro	4	1	1	6
Lake City	13	5	1	19
Lyle	...	2	...	2
Lake Park	2	...	...	2
Minneapolis	9	10	5	24
Monticello	1	...	...	1
New Brighton	...	9	...	9
New Paynesville	...	...	1	1
Osakis	...	1	...	1
Owatonna State Public School	154	110	133	397
Owatonna	1	1	...	2
Peterson	1	...	...	1
Pipestone	...	...	2	2

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Place.	April.	May.	June.	Total.
Plainview	1	...	1	2
Rushford	10	...	...	10
Sleepy Eye	...	4	...	4
St. James	...	1	...	1
St. Paul	...	2	1	3
Tracy	10	...	...	10
Wabasha	2	...	...	2
Wadena	...	2	1	3
Totals	211	162	155	528

The large number of examinations from the state public school is due to the fact that Dr. Adair, the physician in charge, is still separating and moving into other quarters the various "culture cases," with a view to getting rid of the infection during the present summer.

SYNOPSIS OF TYPHOID BLOOD EXAMINATIONS, SECOND QUARTER, 1898.

Place.	April.	May.	June.	Total.
Ft. Snelling	...	2	...	2
Glencoe	...	...	1	1
Milan	...	1	...	1
Minneapolis	58	61	50	169
New Ulm	1	...	...	1
St. Paul	...	...	2	2
Willmar	...	...	1	1
Winona	...	...	1	1
Totals	59	64	55	178

The marked reduction in the number of typhoid blood examinations has made it possible for the clerk to complete the tabulation of these cases. A study of the tables is now in progress, and a report on them can be made in the near future.

SYNOPSIS OF SUNDRY EXAMINATIONS, SECOND QUARTER, 1898.

Diseases.	April.	May.	June.	Total.
Cerebro-spinal meningitis	...	1	1	2
Glanders	...	1	...	1
Obscure disease of horses	...	...	1	1
Rabies	...	1	...	1
Tubercle	9	...	...	9
Totals	9	3	2	14

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Fluid from the ventricles of the brain taken post mortem by Dr. G. D. Haggard of Minneapolis, in a case of cerebro-spinal meningitis in a child, was examined in cover slip preparations, in aerobic and anaerobic cultures, and by animal inoculation, with entirely negative results. In another case of the same disease in a young woman, occurring in the practice of Dr. Hunter of Minneapolis, pus removed by lumbar puncture was examined as above, and showed staphylococci and large numbers of diplococci which were not *Diplococcus intercellularies meningitidis*, and most probably was *Diplococcus pneumoniae.*

Blood from this patient, collected on paper and unweighed, had given an apparent slight Widal reaction in the third week of her illness. A specimen collected afterward, in a proper manner and accurately diluted, gave no reaction.

The specimen in the case of glanders noted above consisted of pus collected by Dr. Brimhall from a small abscess on the hip of a mare which had given a reaction with mallein. Cultures showed staphylococci, large bacilli and mould. A male guinea pig was given intraperitoneally 1.25 c. c. of a thick emulsion of the pus, and died twenty-five days later of staphylococcus infection, having shown no symptoms of glanders.

In the obscure disease of horses noted in the table, a flask of blood was received through Dr. Brimhall six days after its collection by the owner of the horses which had died, after exhibiting "strange" but undescribed symptoms. Cover slip preparations and cultures revealed the presence of large numbers of streptococci. These may have been the cause of the horses' death, though the crude manner of collecting the specimen and its delay in transit would preclude certainty in the matter.

The specimen in the case of rabies was collected by Dr. J. Crewe of Zumbrota, and consisted of the medulla of a cow which had died after symptoms strongly indicative of rabies. One of the first pair of animals inoculated died of sepsis, and one of the second pair is still alive; hence a positive diagnosis has not yet been made.

A dog's head was also received, June 1st, of Mr. J. B. Haberman of Heron Lake, for examination for rabies, but it was in such an advanced state of decomposition when received that inoculations were not made.

Besides these cases, the laboratory has been asked to give advice in two other cases in which children had been bitten by dogs. One of these was the child of Mr. L. Sundeen of Kerkhoven, Minn., and the other of Mr. Stockwell of Minneapolis. In the former instance,

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the dog was kept under observation for three weeks after the bite without showing symptoms of rabies, and in the latter case the dog is still under observation. The Siberian hound received Dec. 14, 1897, from Dr. Price of St. Paul, and which had been bitten by a supposedly rabid dog Dec. 12, 1897, was kept under observation in the laboratory until June 16, 1898, when, no symptoms of rabies having developed, he was returned to his owner, Mr. J. Olszewski of St. Paul.

The nine examinations of sputum for tubercle bacilli were made either of specimens received before the latest ruling of the board in the matter, or of specimens from strictly charity patients.

F. F. WESBROOK, M. D.,
Director.
Per L. B. Wilson, M. D.

Sept. 30, 1898.

The return of the director from sick leave on August 1st found the working and staff of the laboratory in most satisfactory condition, and he takes this opportunity to express his appreciation of the worth of those associated with him in the work, and in so doing feels that it is conveying no news to the board to assure its members that anything deserving of satisfaction in the work of the laboratory has only been possible by reason of the capacity and absolute disregard of self which has characterized those associated with him. The last quarterly report was prepared during his absence, and the account therein given of work done is further proof, were it needed, of this position.

Mr. W. H. Condit very satisfactorily filled the post of temporary assistant for a period of two months ending August 9th. With this exception no changes have occurred in the working force of the laboratory, but a recommendation has been laid before the executive committee that Dr. L. B. Wilson, senior assistant bacteriologist, be permitted to accept a position as senior demonstrator in pathology and bacteriology in the University of Minnesota, where it is desired that only a portion of his time be employed. The executive committee will be prepared to report upon and recommend this. Each member of the board is familiar with particulars of the situation, as set forth in a letter, dated Aug. 10, 1898. Explanation was therein afforded of the somewhat peculiar method of procedure adopted in

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addressing thus individually members of the board, owing to the necessity of haste.

As will be seen from the synopses of the various examinations given under this separate heading, more routine work has been done during the quarter just completed than during any corresponding period in the history of the laboratory, with the exception of the last quarter of 1897, when the season of the year and the relatively large numbers of examinations for the Minneapolis health board, all of which this laboratory was then doing, combined to increase the work.

This pressure of routine work has not, however, prevented entirely the completion of certain researches already begun, nor of the study of problems of the greatest apparent importance arising in connection with the regular working of the laboratory.

STUDIES ON DIPHTHERIA BACILLI.

1. The report of the studies made upon *B. diphtheriae* isolated from the cerebro-spinal fluids and tissues in a case of meningitis simulating human rabies has, with the consent of this board, been put into publishable form by Dr. L. B. Wilson, who made the laboratory investigations, and Dr. G. Douglas Head, in whose practice the case occurred. It is now in the editor's hands, and is to appear in the *Journal of Experimental Medicine*, and might very properly form a part of the biennial report of this board.

2. Investigations into the peculiarities in form, pathogenesis, biology, etc., of *B. diphtheriae* are still in progress, and in this regard it may be mentioned that, from another locality, those particular forms hitherto met with, with one or two exceptions only in the specimens received from the state public school at Owatonna, have apparently been found. The matter is now under investigation, though it has not yet been possible to find any probable connection between the sources of the bacilli in the two places.

3. The bacteriological diagnosis of diphtheria was applied under rather peculiar conditions recently, of which full details will appear in the secretary's report. The incident referred to is that of the shipment of the body of a patient dead of diphtheria, under the certificate of two local health officers that the patient had died of "acute laryngitis." After opening the hermetically sealed box, a public funeral was held and the body buried. It was exhumed, and an autopsy held by the coroner, by order of the secretary of this board, who was present.

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Post mortem clinical findings were suggestive of diphtheria, and cultures made immediately upon blood serum, both from the grumous fluid exuding from the nose and through the cut end of the trachea, gave *B. diphtheriae*, which were very abundant in the latter culture.

Cultures made in the laboratory from the tonsils, and two bits of false membrane, all gave *B. diphtheriae*, in one case almost pure. These bits of false membrane were so necrotic and decomposed that no trace of cell structure could be observed in stained smears made for them, though a few suspicious bacilli were detected.

Full details of the time which elapsed between death and the arrival of specimens and of the method of preparation or embalming of the body for shipment have not yet been received in the laboratory, but it is hoped that, when it is ascertained what, if any, antiseptic methods were employed, and studies have been made upon the virulence of the bacilli which have been preserved in pure cultures, it will be worth publishing as a short note. The peculiar circumstances of the case, and the finding of the bacilli when it had been almost too much to expect, make the matter of extreme interest, and some value to public health.

4. Dr. McDaniel is investigating the effect of admixture of a certain large spore-forming bacillus with *B. diphtheriae* in the ordinary serum cultures used for diagnosis, to determine whether this bacillus, which is frequently found in cultures made directly by physicians, has an inhibitory action on the growth of *B. diphtheriae* on serum, a medium usually considered selective for this microbe (*B. diphtheriae*).

5. Mr. W. H. Condit is engaged in working out a selective medium for diphtheria, which is transparent and capable of being plated.

SYNOPSIS OF DIPHTHERIA EXAMINATIONS, THIRD QUARTER, 1898.

Place.	July.	August.	Sept.	Total.
Austin	2	2	1	5
Anoka	3	...	...	3
Belview	...	2	...	2
Benson	2	...	...	2
Butterfield	1	...	...	1
Brainerd	...	5	2	7
Dassel	...	3	...	3
Faribault	1	1	2	4
Farmington	...	...	6	6
Jordan	2	...	...	2

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Lake City	...	1	...	1
Lyle	...	1	...	1
Mankato	1	...	...	1
Minneapolis	7	9	7	23
Monticello	...	...	1	1
New Paynesville	3	1	1	5
Owatonna (State Public School)	132	145	150	427
Pine City	3	...	...	3
Pipestone	...	1	...	1
Plainview	...	1	...	1
Ruthton	...	3	...	3
St. Cloud	1	...	1	2
St. James	3	3	2	8
Tracy	...	1	7	8
Twin Valley	1	...	...	1
Wadena	5	4	...	9
Willmar	...	...	2	2
Totals	167	182	183	532

As will be seen, about eighty per cent of the examinations during the past quarter have been for the state public school at Owatonna, where the authorities are making strenuous efforts to keep separated those in whose throats are *B. diphtheriae* from those free from this microbe.

Owing to the illness of the director, a large amount of routine work, and the outbreak of typhoid fever at Camp Ramsey, it has been found impossible to pay a visit to this school, though such has been planned several times, and owing to something unlooked for arising, had to be abandoned. It is expected that in a very short time some one will be able to go out from the laboratory and spend the time necessary to go thoroughly over the ground with Dr. Adair, who is keeping careful notes. When these and the laboratory records are collected, it will probably be advisable to make a second and fuller report upon this most unique condition.

It is hoped, too, notwithstanding the persistence of the microorganism, in spite of the efforts hitherto made, that a careful study, on the grounds, of conditions existing, and the use of measures still more radical, may bring about a different state of affairs.

For many months, notwithstanding the large number of examinations made, and the frequent finding of *B. diphtheriae* in the throats, there has been no clinical diphtheria until the recent occurrence of a few cases, mostly of a mild type. This condition may be largely attributable to the attempts at keeping of the bacteriologically clean separated from those showing bacilli, whether ill or well.

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The case of a boy in whose throat *B. diphtheriae* has been found over a long period of time is still under observation. This is the case referred to in "Preliminary Communication on *B. diphtheriae* and Its Variants," read before the British Medical Association in Montreal, September, 1897. *B. diphtheriae* had then been found in his throat fifteen times in seventeen examinations, extending over a period of more than six months. Up to the present time forty-nine examinations have been made of this case, and *B. diphtheriae* has been found thirty-seven times during a period of nearly twenty months. From the time of the first appearance of the bacilli to the date of the last examination which showed their presence, it was nineteen months and two days (Feb. 16, 1897, to Sept. 18, 1898). The last three examinations, on Sept. 23, 26 and 30, 1898, gave negative results. This is the longest persistence of *B. diphtheriae* in any throat yet recorded, where examinations have been made at frequent intervals.

A somewhat peculiar incident was the finding of *B. diphtheriae* in the throat of a nurse, who had not shown symptoms, but had been caring for diphtheria cases last winter in the school for the blind at Faribault. Two specimens were received at the same time from the physician, one of them from a boy who had been at one time in the Owatonna state public school, and in whose throat *B. diphtheriae* had been found twice before whilst in Faribault, the other from the above mentioned nurse. The specimens were upon improvised swabs, contained in bottles, and wrapped in separate pieces of paper bearing the only data yet received.

The physician was written to on September 12th, in view of the peculiar findings, viz., that the examination of the specimens from the nurse gave a positive, whilst that of the boy gave a negative, result. He was asked whether a possible chance of the specimens having become exchanged during packing existed, and was assured of the wish of the laboratory to coöperate in any way possible. No answer has been received up to the present time, and it is feared that the letter has not reached its destination.

The case of the boy is deserving of some special mention. He had been an inmate of the Owatonna state public school, where, though showing no symptoms of the disease, *B. diphtheriae* was discovered on July 22d, August 5th and 12th, September 3d and 16th, and October 6th, 11th and 23d, in specimens taken from his throat. On August 20th, 29th and October 11th the examination of specimens failed to show the diphtheria bacillus, and he was released from quarantine after the report on the latter examination had been re-

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ceived at the school. He left the school in the latter part of October, 1897, and went to Faribault, where he entered the school for the blind. On July 8, 1898, as the Owatonna public school refused to readmit him until his throat had been pronounced free from diphtheria bacilli, a specimen was received in the laboratory from Faribault.* It showed the presence of *B. diphtheriae*, as did a later specimen on August 2d.

Nothing further has been heard from him. The secretary and executive officer of this board has gone into the matter very fully, and is now endeavoring to trace any possible connection between this case and the appearance of diphtheria at Faribault.

It might perhaps be well to institute a thorough investigation into the conditions, from a bacteriological point of view, at least, in the school for the blind, somewhat upon the lines of those in vogue at Owatonna.

The use of the bacteriological method of diagnosis in diphtheria is being more widely adopted throughout the state, and as, by the action of the board, taken at the first quarterly meeting, 1898, two negative reports are demanded before release of quarantine is to be permitted, it will be necessary that this action be known to all local health officers.

It also means a very large amount of work for the executive officer or the laboratory, in keeping careful watch over all physicians sending specimens to the laboratory, in order to see that patients are not dismissed from quarantine until two consecutive examinations give negative results.

The wider use of the bacteriological method has had the result, that, of the 300 diphtheria boxes with contents originally in the possession of the laboratory, less than ten are at present available, and 200 more had to be obtained hurriedly for temporary use, as it is hoped that some more convenient and better arrangement for the transmission of diphtheria specimens may be devised.

STUDIES ON BACILLUS TYPHOSUS.

1. In connection with the investigation of possible means of infection, if not of the original source of the epidemic, samples of water were examined and flies were caught in sterile traps from one

*A note from the physician stated simply that the boy had been exposed to diphtheria, and it was not until later that it was found that he had ever been at, or wished to re-enter, the Owatonna school.

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of the regimental sinks and one of the company kitchens of the Fifteenth Minnesota United States Volunteers, encamped at Fort Ramsey.

From the latter a bacillus in many points resembling, if not actually, *B. typhosus* was obtained and studied, as well as that bacillus isolated by Dr. Miller, bacteriologist to the St. Paul board of health, from a delivery tank used for distributing water to the regiment.

A fuller preliminary report is given under the typhoid routine examinations. (See page 175.)

2. In a case of typhoid fever in which convalescence had apparently set in and the patient had been on full diet one week, death occurred after the appearance of symptoms of cerebro-spinal meningitis, of which evidence was found on autopsy seven (?) hours after death.

From the fluids and tissues of the brain a bacillus has been found which is, so far as cultural peculiarities are concerned, not to be distinguished from *B. typhosus*. It reacts also to the blood of patients who are known to be suffering from typhoid fever.

It was impossible for anyone from the laboratory to be present at the autopsy, but Mr. C. B. Lenont, senior interne at Asbury Hospital, Minneapolis, collected the materials in sterile receptacles according to directions, and the cultures were made in the laboratory by Dr. McDaniel, who is engaged in further study as to pathogenesis, etc., of the organism.

The micro-organism was found apparently unmixed with other microbes, in purulent fluid taken in a sterile pipette and sealed in the flame. Stained smears of this material showed no other forms, but many of the bacilli were contained in the leucocytes. Another lot of thick fluid, poured from the base of the skull into a sterile Petri's capsule, gave a mixed growth of this bacillus and *Staph. pyogenes aureus*, which latter may have been introduced from outside by the saw or other instruments used. Whether it was a case of mixed infection has not yet been determined.

Full clinical and autopsy notes have not yet been received, but it is hoped on its receipt and further study that a fuller report may be given to this board and an account prepared for publication elsewhere.

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SYNOPSIS OF TYPHOID FEVER EXAMINATIONS, THIRD QUARTER, 1898.

Place.	July.	August.	Sept.	Total.
Anoka	...	...	1	1
Buffalo Lake	...	...	4	4
Camp Ramsey	...	47	...	47
Ft. Snelling	...	...	36	36
Kenyon	1	1	1	3
Lake City	...	5	...	5
Long Prairie	...	...	1	1
Milaca	...	...	2	2
Minneapolis	60	264	175	499
Montevideo	...	...	1	1
Monticello	...	...	1	1
St. Paul	2	219	155	376
St. Peter	...	...	2	2
Wadena	...	1	...	1
West Concord	1	...	3	4
Wykoff	...	...	1	1
Zumbrota	...	...	2	2
Totals	64	537	385	986

The above summary of typhoid blood examinations indicates that the routine work in this particular has been greater than during any previous quarter. This has been due in a large measure to the outbreak of typhoid fever in the Fifteenth Regular United States Volunteers, while stationed at Camp Ramsey, on the site of the state fair grounds. On August 16, 1898, on an invitation from the surgeon general of the United States Army, this laboratory undertook the investigation of the outbreak in collaboration with the military authorities. The essential facts brought out in this joint investigation are about as follows: On July 6th the Fifteenth Minnesota Regular United States Volunteers, composed of men from various portions of the state, was mobilized at the state fair grounds, and placed in camp on the grounds formerly occupied by the Twelfth Minnesota Volunteers. This latter regiment had had no cases of recognized typhoid fever, either while at the camp or for three weeks after leaving it.

The camp was on high ground in the northeast corner of the state fair inclosure. The soil was the ordinary gravelly glacial drift of the locality. The privy and kitchen sinks were to the northwest, in the area formed by the race track tangent, to the north side of the grounds, and more than a hundred yards from the nearest tents.

The company mess tents were at the north end of the camp, and the office and hospital tents at the opposite extremity. The tents

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had all been pitched on exactly the sites occupied by the tents of the Twelfth Regiment. The quartermaster's stores were kept in one of the state fair buildings, 30 yards south of the camp. Butter and fresh meat were delivered every morning at the company mess tents, and there placed in loosely covered barrels, on ice wrapped in cloths.

No milk was served until after the outbreak of fever. The original source of the water used for cooking and drinking purposes was a driven well, lined with galvanized iron pipe, 135 feet deep, and situated 400 yards south of the camp site. From this well the water was forced by a steam pump into a covered wooden tank, the top of which was about twenty-five feet from the ground. Pipes leading from this tank distributed the water to various portions of the state fair grounds, though not to any point nearer the camp site than the well itself. The water was hauled to the mess tents in an old wooden barrel-shaped tank. This wagon tank was filled at a stand pipe, some thirty yards from the original supply tank, through an old rubber hose attached to the stand pipe. It was emptied at the mess tents, through a dilapidated rubber hose attached to the wagon tank, into loosely covered barrels. There were three of these barrels for each company, one for drinking and two for cooking purposes.

Aside from the hygienic conditions noted above, it should be stated that the men were largely from the smaller towns and farming districts of the state; that they were volunteers not yet accustomed to discipline; that they had free run of the state fair grounds and the numerous water closets, drinking taps, fruit stands, etc., thereon; and that they were frequently given leave of absence from the grounds to visit the cities of St. Paul and Minneapolis, to which they had free transportation on the street cars.

About August 3d typhoid fever made its appearance simultaneously in four of the twelve companies. These companies were encamped quite widely apart, two or three unaffected companies being between each pair of those affected. From August 3d to August 15th a large number of cases developed in the four companies as noted, being somewhat evenly distributed along the four company lines, though not showing to any extent in the other companies of the regiment. About this time all the unaffected companies were removed to the southern portion of the fair grounds, the rubbish on the original site burned up, along with the straw from the men's beds, and the tents of the affected companies removed several yards

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distance from the original sites. From this time on scattered cases arose in all the companies, though the four first affected maintained their original higher percentage of sick. The whole regiment was removed to the federal reservation at Fort Snelling August 23d, and from thence to Camp Meade, Pa., about September 15th.

About August 15th the St. Paul city laboratory, under the erroneous impression that the camp was under the jurisdiction of the city, began the bacteriological examination of water from the various supply taps, etc., on the grounds, and succeeded in isolating from water collected from the hose attached to the wagon tank (mentioned above) an organism which biologically resembles in many, though not in all, points the *bacillus typhosus*.

On August 20th this laboratory collected water from three taps supplied from the main tank, from a surface well in a barn yard on the fair grounds, and from one of the barrels at the mess tent of Company H (the most affected company). Flies were caught in sterilized metallic traps in the regimental privy trench and on the food barrel at the mess tent of Company H.

All these were carefully examined for typhoid organisms, and a bacillus was isolated from the bodies of the flies secured at the mess tent which in most, though not all, respects resembles *B. typhosus*. The results of the examinations of the other specimens were entirely negative. The organism isolated from the water by the St. Paul city laboratory and the one isolated from the flies by this laboratory are still under investigation.

Repeated tests for the Widal reaction in the blood of the men with suspected typhoid fever were made in 342 cases. Of these 241 gave one or more positive reactions. A few cases from the regiment were not tested, owing to the fact that specimens were not sent in by the attendants in the hospital to which the patients were sent. Full information has not yet been received from the hospitals concerning the history of all cases.

A map showing the location and date of attack of all the early cases, which was asked for by this laboratory from the surgeon major of the regiment, is not yet to hand. When this data, and also further information concerning the true nature of the organisms still under investigation, is obtained, a detailed report will be made. The secretary will report on the quarantine and disinfection measures taken at various times during the epidemic.

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SYNOPSIS OF SUNDRY EXAMINATIONS, THIRD QUARTER, 1898.

Diseases.	July.	August.	Sept.	Total.
Cerebro-spinal meningitis	...	...	1	1
Fly examinations	...	2	...	2
Obscure diseases of horses	...	...	1	1
Rabies	1	1	...	2
Water examinations	...	5	...	5
Totals	1	8	2	11

The first of the cases of suspected rabies which the laboratory has investigated during the past quarter occurred in the practice of Drs. Hunter and Head of Minneapolis. The subject was a boy eight years of age, who died after twelve days' illness, resembling rabies. The autopsy was held seven hours after death. From the meningeal fluid from various portions of the central nervous system and from the nerve tissue itself there was obtained in abundance, both on cover slip preparations and culturally, Fraenkel's *Diplococcus Pneumoniae.* Two rabbits inoculated subdurally with portions of the medulla of the child died in one and four days respectively, with the symptoms, and, post mortem, lesions of meningitis, and from their brains the *diplococcus pneumoniae* was isolated.

The second case was that of a cow, the fifth to die, with similar symptoms, on the farm of Anthony Welch, near Rosemount, Minn. The animals died within a few days of each other, with symptoms as somewhat vaguely described by the owner, resembling those exhibited by cattle suffering from rabies. The cow in question was seen by Dr. Brimhall an hour before her death, but nothing characteristic in the symptoms could at that time be determined.

The autopsy was held eight hours after death. Red hepetization of a portion of one lung was observed. Some, though not marked, meningitis was present. Other post mortem findings were negative.

In the meningeal fluid and in the substance of the brain there was found in cover slip preparations and isolated culturally an organism not distinguishable from the *diplococus intercellularis meningitidis* of Weichselbaum.

Two rabbits inoculated with portions of the medulla of the cow died in one and two days respectively, with marked meningitis, and the diplococcus present in the original material was present also in the brains of both rabbits.

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DISEASE IN HORSES.

A bacteriological investigation is in progress, of material secured at the autopsy of a horse dead of an obscure disease which has caused the death of several horses in the vicinity of Elk River and Anoka. A bacillus has been isolated from the spleen and heart's blood of the horse in question, but its identification and pathogenesis have not yet been fully worked out.

TOUR OF INVESTIGATION.

Dr. L. B. Wilson has just returned from a two weeks' visit to Eastern laboratories, where he was courteously afforded every facility for seeing and closely examining things likely to be of profit or interest to this laboratory.

It was especially desired that he should have an opportunity of getting all the details possibly obtainable in regard to the investigation now in progress by the bureau of animal industry upon hog cholera. Full returns have not yet been received from Iowa, where the experiments are being conducted, and it was perhaps not to be expected that any premature announcements would be made concerning the work. The official report is expected to appear in January, 1899. It is hoped that this laboratory may soon have means afforded of studying here this disease from an experimental laboratory point of view.

In many other matters valuable hints and suggestions were obtained and carefully recorded. They are now under consideration. When they have been properly weighed and adapted to local conditions in this state, they may be put in the form of recommendations and brought, through the executive committee, before the board.

To inquiries concerning the attitude of other board of health laboratories in the matter of water analysis, the unanimous reply was that they coincided with the views expressed by this board in its forthcoming "Circular of Information, No. 2," at present in press.

The general expression of opinion was that cursory bacteriological examinations of samples taken irregularly is of no value whatever except to the person making the examination, provided he be paid for it.

All the authorities agreed that bacteriological examinations of water to be of value must be frequent, regular, and conducted even to the collection of the samples by a trained bacteriologist. They are therefore very expensive in consideration of the time consumed.

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A source of gratification to this board should be the following of its example in the establishment and proposed establishment of laboratories by certain other state boards of health.

Several communications of a flattering nature have been received, in which advice, full sets of laboratory printed material, and particulars in regard to certain methods have been asked for.

It is hoped that the advanced position which this board has taken in providing a laboratory equipment and workers to afford local health boards of the state a scientific basis for the regulation of supervision, and, if necessary, quarantine, of certain diseases, to further the study of matters arising out of this work, and in general the testing of new methods, etc., may be maintained.

F. F. WESBROOK, M. D.,
Director.

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GENERAL CIRCULAR OF INFORMATION NO. 2.

Minnesota State Board of Health, Bacteriological Laboratory
(University of Minnesota), Minneapolis.
September 1, 1898.

STAFF.

F. F. Wesbrook, M. D., Director.
Louis B. Wilson, M. D., First Assistant Bacteriologist.
O. McDaniel, M. D., Second Assistant Bacteriologist.
Olive D. Bishop, Clerk.

INTRODUCTORY.

The principal objects for which this laboratory was established are.

1. To assist, when necessary, local health boards throughout the state in the exact determination of foci of known infectious diseases, and thus attempt to prevent the spread of such diseases.

2. The investigation of infectious diseases of obscure etiology; of new methods of bacteriological diagnosis; of the values of various commercial antitoxines, disinfectants, etc.; and in general of bacteriological problems, exact knowledge concerning which may prove of value to the state.

Concerning diphtheria antitoxine, vaccine and tuberculin for use on human beings, inquiries should be addressed to Dr. H. M. Bracken, secretary of the state board of health, St. Paul, whilst communications relative to tuberculin for veterinary purposes, mallein, etc., should be addressed to Dr. M. H. Reynolds, director veterinary department state board of health, St. Anthony Park.

This laboratory does not undertake at present to furnish to physicians vaccine, antitoxine, tuberculin, mallein, nor any other similar products; neither does it make any examinations which are obviously valueless to public health, and merely a convenience to the physician in relation to his private patient.

All infectious diseases of men or animals, coming in any way under the surveillance of local health boards, demand and receive first attention. That the spread of such diseases may be prevented, it is of vital importance—

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1. That an early accurate diagnosis be made, and the source of infection located.

2. That certain knowledge be obtained of the exact length of time during which a disease may spread from a given case or place.

Ordinarily it is only necessary that specimens should be properly collected and sent to the laboratory by physicians or health officers.

When, however, epidemics exist, or when from any cause, on full representation of the conditions by the local health officer, it appears advisable to do so, a bacteriologist will be sent out from the laboratory to assist the local authorities in making investigations and collecting specimens.

The object of this circular is to afford information, on the one hand, of what the laboratory is prepared to do, and, on the other, of what is necessary on the part of those desiring assistance from it.. Since the circular is not for the publication of scientific work done here or elsewhere, no apology is necessary for the absence of a bibliography on the subjects dealt with.

To those interested in the scientific work of the laboratory copies of the various published papers will be sent gratis:

GENERAL DIRECTIONS.

COURSE TO BE FOLLOWED IN ORDER TO SECURE EXAMINATION OF SPECIMENS.

In all matters except the routine examinations of specimens from the throat in diphtheria and blood in typhoid fever, the specimens must come, not from physicians or others interested, but through the local health board. The representative of the local board will be required to furnish all data obtainable in reference to the case, and state the probable advantages which such examinations will bring to the community, and what course of action will be taken by the local board if the suspicions are confirmed.

It will often save a great deal of time and needless disappointment if the data spoken of be sent first to the laboratory, when the necessary instructions or cautions can be given.

Past experience has shown that frequently the possibility of examination of the specimen sent has been lost by too great haste, and the failure to comply with the ordinary simple procedures necessary to secure results, which could have been obviated by preliminary correspondence.

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The work of the laboratory has grown so enormously that it is necessary to select with care the cases for examination which are most pressing and most promising of results.

The laboratory reserves to itself, therefore, the right of refusing to undertake investigations, where the reasons for asking them and data given seem insufficient, or the methods of collecting and forwarding specimens have been such as needlessly to increase the difficulties of examination.

As the examinations made are for the purpose of promoting public health, reports of all diagnoses given will be sent to the attending physician and the local health officer, as well as to the secretary of the state board of health.

COLLECTION OF SUNDRY SPECIMENS FOR BACTERIOLOGICAL EXAMINATION.

In the bacteriological investigation of any material it is necessary to secure its arrival in the laboratory:

(a) Without admixture of any microbes other than those originally present, and which are the supposed cause of the conditions which led to the request for an examination.

(b) Without any increase in the bacteria either originally present or accidentally introduced.

When there is good evidence for believing certain meat, milk or other article of food to be the medium for the transmission of an infectious disease, or when the examination of a portion of a diseased animal is desired, it must be removed from the body aseptically, with instruments which have been sterilized by dry heat or boiling (not by chemicals), and sent in the following manner:

Thoroughly wash, then boil in sufficient clen water to completely cover it, for fifteen minutes, a new glass fruit jar,—its rubber ring in position on the neck,—and its glass or porcelain-lined cover. Remove the jar from the water; empty it; place the cover on loosely, and allow the whole to cool. Then remove the cover, and *at once* put in the specimen. No preservative of any kind must be put in the jar unless specifically stated elsewhere in this circular under the description of the particular disease. If the material is a fluid, pour it directly into the jar; if it is a solid, put it into the jar with a knife or spoon which has just been boiled for fifteen minutes. Put the cover tightly on the jar; wash off the outside of the jar with 5 per cent carbolic acid, or 1-1000 corrosive sublimate; wrap the jar in a heavy cloth to prevent breakage; pack the jar carefully in a box, with sawdust and plenty of ice, and ship to the laboratory by express prepaid.

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After the jar and cover have been boiled, neither should be touched near its mouth by the hands nor by any object whatsoever, until the jar is finally closed ready for packing.

FORWARDING SPECIMENS FOR BACTERIOLOGICAL EXAMINATION.

1. No delay must occur between the collection of a specimen and its shipment to the laboratory. If delay is absolutely necessary, specimens must be kept upon ice.

2. All specimens must be plainly addressed to "Minnesota State Board of Health, Bacteriological Laboratory (University of Minnesota), Minneapolis."

3. Express charges must be prepaid.

4. The fullest information must accompany, or precede, all specimens, as no investigations can be begun until it is at hand. Specimens must be plainly marked with the name and address of the sender, and the contents of each package indicated.

5. All materials to be examined for the presence of pathogenic bacteria are to be regarded as dangerous to all persons handling them, therefore not only should they be so packed as to ensure against possible breakage or leakage, but where any doubt exists as to the contamination of the outside of the receptacles in which they are contained, the whole exterior—after sealing—should be thoroughly disinfected by corrosive sublimate (1-500) or carbolic acid (5 per cent). Concerning packages sent by mail, see United States Postal Laws and Regulations, of which the following is a copy:

ORDER OF THE POSTMASTER GENERAL.

OFFICE OF POSTMASTER GENERAL,
WASHINGTON, D. C., Dec. 27, 1897.

Order No. 677.

That the order of the postmaster general of Feb. 5, 1896 (Order No. 88), prescribing the conditions under which specimens of diseased tissues may be admitted to the mails, is hereby modified in the following manner:

Specimens of diseased tissues may be admitted to the mail for transmission to United States, state or municipal laboratories, only when inclosed in mailing packages constructed in accordance with the specifications hereinafter enumerated.

Upon the outside of every package shall be written or printed the words "Specimen of Bacteriological Examination." No package containing diseased tissue shall be delivered to any representative of any of said laboratories until a permit shall have first been issued by the postmaster general certifying that said institution has been found to be entitled, in accordance with the requirements of this regulation, to receive such specimens.

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Specifications for the construction of packages for safely conveying through the mails pathological specimens for bacteriological examination for diagnosis in cases of suspected diphtheria, tuberculosis, and other communicable diseases:

(1) The receptacle for moist specimens of diseased tissues shall be a strong glass vial having a capacity not greater than two drams. Said vial shall be covered and made water-tight by the use of a metal screw cap and a rubber or felt washer which has been immersed in melted paraffine.

(2) Said vial shall be placed inverted in a circular tin box. Said box shall be made of I. C. Bright tin-plate, and shall have flush or countersunk bottom and soldered joints, and shall have the following dimensions, viz.: Diameter two and one-quarter inches, length three and one-half inches. This box shall be closed by a metal screw cover and rubber or felt washer, and it shall be so packed with absorbent cotton that the glass vial contained in said tin box shall be evenly surrounded on all sides by said cotton and the cotton shall be closely laid.

(3) Said tin box shall be placed inverted inside of a larger tin box similar to the one already described, but measuring not less than two and three-quarter inches in diameter and not less than four or more than four and three-eighths inches in length. Upon the inside of the sides and bottom of this outer tin box there shall be a lining of compressed paper not less than three-sixteenths of an inch in thickness. Said outer tin box shall be closed by a metal screw cap and rubber or felt washer.

(4) The receptacles for dry specimens of diseased tissues shall be a glass test tube, three inches in length and one-half inch in diameter. Said test tube shall be inclosed in a circular tin box similar to those already described, but measuring two and one-quarter inches in diameter and three and one-half inches in length, and be lined upon its sides and bottom with compressed paper not less than one-quarter of an inch in thickness. Said box shall be closed by a metal screw cap and rubber or felt washers. Said test tube shall be closely packed in cotton.

JAS. A. GARY,
Postmaster General.

COMMUNICATION WITH THE LABORATORY.

All telegraph and telephone messages to the laboratory must be prepaid. All messages sent from the laboratory will be sent collect. All telephone communication with outside points must be secured by the person desiring communication, as the laboratory will not undertake to call up by telephone any person outside of Minneapolis.

All work done in this laboratory is free of charge.

The laboratory is open from 9 a. m. to 4 p. m., except on Sundays and legal holidays.

DIPHTHERIA.

Following upon the laboratory investigations of the Minnesota State Board of Health and of certain eastern city boards of health,

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the presence or absence of *B. diphtheriae*, in any given case, has been adopted as a means of regulating quarantine by some local health boards of this state, e. g., St. Paul and Minneapolis; and its advantages are many. The most obvious are:

1. The mildness or severity of the clinical symptoms in any given case is not an index of the danger of contagion from the case.

2. *B. diphtheriae* in about ninety-eight per cent of the throats in which it is present (see New York Board of Health Report)) is virulent. It thus renders the patients possible foci of epidemics throughout their entire period of infection.

3. The inconvenience to the few of restraining by quarantine the rare cases in which the bacteria persist for a long time after the subsidence of all clinical symptoms would be more than offset by the safety of the many who might otherwise become infected.

4. Further, the period of infection, in many cases, has been shown by the bacteriological method of examination to be considerably shorter than that usually adopted as the standard for the maintenance of quarantine, being occasionally as low as ten days.

5. Those cases in which the symptoms are due to the presence of *B. diphtheriae* have been shown to be much more liable to set up similar throat symptoms in those with whom they come in contact than is the case in sore throats due to other micro-organisms.

6. Quarantine and disinfection in the latter cases is not deemed necessary; thus many who might upon clinical evidence alone be subjected to these inconveniences escape them.

This laboratory has been affording opportunities for systematic investigations of this kind during the past two years, during which over 5,000 diagnoses have been given. The examinations during this time have served to verify the above conclusions in all points, and local health boards are urged to adopt this method of diagnosis exclusively.

With this in view the Minnesota State Board of Health at the regular quarterly meeting held April 12, 1898, adopted the following:

REGULATIONS FOR THE QUARANTINE OF DIPHTHERIA.

Hereafter local boards of health shall be required to adopt one of the following alternatives for the regulation of the quarantine of diphtheria:

1. A time limit of four weeks from the inception of the disease.

2. Regulation by bacteriological findings. Under this there must be two negative reports on smears taken from the throat of the patient by some responsible party.

The bacteriological regulation is preferred.

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The following is a description of the necessary steps:

On request, boxes containing culture medium and probang are supplied for the transmission of material from the throats of suspected cases: With each box, the following directions are sent:

DIRECTIONS FOR COLLECTING AND FORWARDING SPECIMEN FOR DIPHTHERIA EXAMINATION.

Thoroughly rub the cotton swab against any visible exudate and also against all injected mucous membrane of the fauces, pharynx or posterior nares. Rub the swab thus charged firmly over the solid culture medium without breaking up the surface. Replace the swab in its own tube and the cotton plugs in both tubes. Take care not to touch the mouth of either tube nor any object other than the inflamed area with the swab either before or after it has been used.

Pack the tubes securely in the box so as to prevent breakage, wrap the whole in tough paper, tie firmly and send at once to the laboratory by express PREPAID. (See order of postmaster general, page)

Boxes in which medium is dry or contaminated should not be used, but should be returned to the laboratory.

With the box is sent also the following blank:

DATA TO ACCOMPANY SPECIMEN FOR DIPHTHERIA EXAMINATION.

Please fill out this blank and leave in box.

Date and hour .....

Patient's name ..... Address.....
Physician's name ..... Address.....
Health officer's name..... Address.....
Has this case been reported on before? .....If so, give previous case No....
Patient's age..... Sex ..... Temperature .....
How long since disease commenced?.....Is a membrane present?.....
Remarks ....
Physician's diagnosis ..... Do you desire telegraphic report? .....

After taking the specimen and properly filling in the blank, the box must be immediately returned for examination. It is possible within from twelve to twenty-four hours from the receipt of a specimen to determine the presence or absence of *B. diphtheriae*, and the diagnosis may be reported by telegraph if desired.

No diagnosis can be made until a culture is obtained. From this laboratory no immediate diagnosis is ever given (unless it be positive) from the swab alone, as investigation has shown that apparent freedom of the material on the swab from *B. diphtheriae* may be contradicted by a rich growth on the culture medium in a few hours.

All specimens received in the laboratory before 4 p. m are reported on by noon of the following day, and copies of the following report blank are filled out and sent to the physician furnishing the

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specimen, to the local health officer, and to the secretary of the state board of health:

REPORT OF EXAMINATION FOR DIPHTHERIA.

Case No..... Received.....
Patient's name ..... Address.....
Physician's name ..... Address.....
Health officer's name..... Address.....
Previous Case No.....
Examination—Swab .....
Culture .....
Remarks ....
Reported ..... Diagnosis .....

The diagnoses given vary in wording and interpretation as follows:*

"Diphtheria" means that *B. diphtheriae* was demonstrated culturally and microscopically, with or without marked admixture with other microbes. When others are numerous, their presence is noted. The relative number of the bacilli of diphtheria found, or their short or long persistence in the throat, cannot be taken as an index of the danger of contagion. (See "Special Notice, No. 1," pag ....

"No diphtheria bacilli found," means simply that *B. diphtheriae* was not found in the specimen examined, which may have been due to:

(a) Improper technique in applying the swab to the throat. Considerable vigor should be used, so that not only the prominent parts of the mucous membrane, but the depressions have been rubbed. The depressions are less apt to have been mechanically cleaned by swallowing foods, gargling, etc.

(b) Some antiseptic may have been used in the throat immediately prior to taking the specimen, thus interfering with subsequent development of the culture.

(c) Improper technique in smearing the swab over surface of the medium, whereby the infected surface of the swab was not brought in contact with the solidified serum.

(d) It is, of course, possible that a very few bacilli, amongst a large number of other bacteria in the growth, might be overlooked in the laboratory. This has, after careful statistical study of many examinations, been found to be unlikely to occur.

(e) Entire absence of *B. diphtheriae* in the throat.

No diagnosis may be given, on account of nondevelopment or scanty growth of culture. Then "No Growth" or "Scant Growth"

*The possibilities of wording and interpretation of same is printed on the back of the report blank.

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is stamped upon the diagnosis report, and another specimen is asked for.

RELATION OF DIAGNOSES GIVEN TO PRECAUTIONARY MEASURES.

On the diagnosis of diphtheria for the first time in any community the following notice is sent to the physician:

SPECIAL NOTICE, NO. 1.

March 1, 1898.

When a diagnosis of diphtheria is given in any case on the disappearance of clinical symptoms and before quarantine is raised, second specimens should be sent in from it, in order to determine how long the bacillus diphtheriæ remains in the throat.

It is plainly apparent that so long as the bacilli are present the patient, unless quarantined, may be a source of danger to others.

To know definitely of the presence or absence of this danger is of the utmost value to the physician in enabling him to determine the necessity of quarantine.

Where the second examination still shows the bacilli present, quarantine should be rigidly maintained and specimens sent in until bacteriological examination shows the throat to be clear.

In all cases between the time of the sending of the specimen and the receipt of the laboratory diagnosis, the patient is to be regarded as possibly dangerous to public health.

Where it is impossible to give a diagnosis for any reason (unsatisfactory culture, etc.), the patient should be kept isolated until a clear negative diagnosis is given. In view of the possible fallacies in a negative diagnosis (see above), it is recommended, especially where clinical symptoms persist, and still point to infection by *B. diphtheriae*, that second specimens be sent and isolation be maintained until a second negative report is received.

Special attention is called to the necessity of returning unused boxes, as, after a time (three to six weeks), the culture medium becomes unfit for use.

Where an examination is desired, and no culture box is at hand, a portion of membrane or a small swab of cotton (sterilized by heat —not by chemicals), which has been rubbed over the inflamed surface of the throat, may be sent in a perfectly clean bottle, which, with its stopper, has been boiled for fifteen minutes. When specimens are sent in this way (improvised swab) there may be a little delay in diagnosis, *and the diagnosis is of value only when the result is positive*, since it has been the experience of this laboratory that immediate inoculation of serum at the bedside has often given a growth of *B. diphtheriae* when it has been impossible to obtain it from another swab taken at the same time and forwarded to the laboratory, and there sown upon serum. The reverse has not occurred.

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No chemical antiseptic should be used either in the sterilization or in the throat immediately prior to the taking of the specimen, as its presence might prevent the growth of the cultures subsequently made.

All specimens must be very carefully packed, so as to avoid breakage and possible danger to common carriers, and must not be sent by mail unless in strict compliance with postal regulations. (See page 184.) This precaution must be insisted upon, and any violation of postal regulations will be reported to the authorities, should it have escaped their notice,—in accordance with the obvious duty of a department of a state board of health for the preservation of the public health.

DIPHTHERIA ANTITOXINE.

In reference to this now widely used therapeutic agent, the following special notice is sent with the first diagnosis given in each case:

SPECIAL NOTICE, NO. 3.

Feb. 25, 1897.

In order to obtain clinical data for coördination with laboratory investigations relative to strength and purity of various diphtheria antitoxines on the market in this state, the following information is requested in each case in which antitoxine has been used. Please fill out the form given below and return it to the laboratory.

Original Case No..... Date of original report.....
Patient's name .....
Kind of antitoxine used.....
Date of manufacture of antitoxine..... Dose.....
Date of inoculation..... How long after commencement of disease .....
Effects of inoculation—
(a) At point of inoculation.
(b) In throat.
(c) General.
Remarks ....
....
Dated..... Signed .....

Wherever the antitoxine has been used, whether the laboratory diagnosis is diphtheria or not, it is requested that the blank be filled out and returned, since it is quite proper to give this treatment should it be indicated clinically, without waiting for the laboratory report.

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TYPHOID FEVER.

The recent researches of Widal, Johnston and others have apparently provided a means for the early bacteriological diagnosis of this disease. From Nov. 1, 1896, to Nov. 1, 1898, over 4,100 specimens of blood from over 2,000 different patients were examined by the method in this laboratory, and the results show a high percentage of accuracy.

In September, 1897, a method for obtaining more exact proportions of the materials used in the test, namely, weighing the dried blood, and adding a measured quantity of distilled water, was here originated and adopted. In order to facilitate the proper collection of blood for a test by this method, there is sent to those desiring it an outfit consisting of (a) an aluminum wire loop, (b) a slip of aluminum foil, and the following blank:

DATA TO ACCOMPANY SPECIMEN FOR TYPHOID FEVER EXAMINATION.

Date and hour of collection.....

Patient's name ..... Address.....

Physician's name ..... Address.....

Health officer's name..... Address.....

Has this case been reported upon before? ....If so, give former case No.....

Patient's age ..... Sex..... Temperature.....

How long since disease commenced?.....

What is the supposed source of infection?.....

When, if ever before, has patient had typhoid fever?.....

Remarks .....

.....

Physician's diagnosis..... Do you desire telegraphic report?.....

All the above are enclosed in an envelope bearing the following directions:

OUTFIT FOR COLLECTING SPECIMEN OF BLOOD FOR SERUM DIAGNOSIS OF TYPHOID FEVER.

To secure a reliable reaction with dried blood it is necessary that a comparatively large amount be collected in as cleanly a manner as possible. Hence please observe carefully the following directions:

Wash with boiled water the part from which the blood is to be obtained—(the lobe of the ear, end of finger or toe in infant). Prick deeply the skin with a clean needle or scalpel. Remove four or five loopfuls of blood with the wire loop in outfit, placing each by itself near one edge of the aluminum square enclosed. Make a roll about 1 cm. in diameter—of the square, turning inward the blood without smearing it. Flatten one end of the roll and turn the edge over to prevent it from opening. **ALLOW THE BLOOD TO DRY,** then make a tight packet of the roll by flattening and turning over the other end. Fill out the data blank **IN FULL,** return it with the foil-packet and wire-loop to its envelope; place this in a larger envelope and mail to the laboratory.

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The specimens of blood for typhoid test, received in the laboratory before noon are reported on by five o'clock of the same day. Those arriving after noon lie over until the following day. When the test is completed, a copy of the following report is sent to the physician sending the specimen, to the local health officer, and to the secretary of the state board of health.

REPORT OF SERUM TEST FOR TYPHOID FEVER.

Case No..... Received.....
Patient's name ..... Address.....
Physician's name ..... Address.....
Health officer's name..... Address.....
Previous Case No.....
Reaction .....
Remarks .....
.....
Reported ..... Diagnosis .....
(from above reaction.)

Reactions are noted as "Present," "Absent," or "Partial."

*The inferences to be drawn from these are as follows:

1. When the reaction is "Present," the patient has now, or (rarely) has had in the recent past, an infection with the bacilli of typhoid fever. Note that while he may not have typical typhoid fever, the presence of the reaction—except in the rare instances of persistence from a previous infection—indicates the presence of the germs of the disease, and a source from which it may possibly spread to other members of the community. Such a patient should be reported to the local health officer, his dejecta sterilized, and in general measures taken to prevent further dissemination of the infective bacilli.

2. When the reaction is "Absent," the patient either does not have typhoid infection, or it is too early in the course of the disease for the reaction to appear. It sometimes appears as early as the second day from the onset of the first symptoms, usually within the first week, but may be delayed as late as the tenth day, and, in very rare instances, until a much later period.

3. When the reaction is "Partial," further examinations of subsequent specimens, with varying dilutions,† will serve to show its real absence or presence.

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*The interpretations of diagnoses are printed on the back of the report blank.

†The standard dilution employed is one part of fresh, or one-fourth part of dried, blood to twenty-five of the dilutent.

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In all cases of apparently beginning typhoid, specimens should be sent as early and as frequently as possible, in order—

(a) That an early diagnosis may be made, and measures for public safety continued.

(b) That material may be obtained for further study of the relation of the intensity and persistence of the reaction to the course of the clinical symptoms.

Accompanying the first report on each case there is sent to the physician in charge the following:

SPECIAL NOTICE NO. 4.

Dr. .....

.....

Dear Sir: In the present state of our knowledge concerning the serum test for typhoid fever, it seems necessary, as in the trial of any new means of diagnosis, that the fullest collateral information available be obtained. Hence it is requested in Original Case, No. ...., Name..... reported by you ..... in which the reaction was ....., that the following information be furnished as soon as the patient is dismissed from your care.

How long did the disease continue? .....

What conditions suggestive of typhoid fever were present and on what days were they noted? (Please arrange data in the following order and fill in where possible:) .....

Alimentary System (tongue, stomach, intestines—diarrhœa, hemorrhage, etc.)

.....

.....

.....

Skin (if spots appeared, when? etc.).....

.....

Urinary system (albumin, presence or absence of diazo reaction, if tested)

.....

.....

Respiratory system (epistaxis, bronchitis, pneumonia, etc.).....

.....

Nervous system .....

.....

Circulatory system and spleen.....

.....

Temperature (daily, if possible, if not, some general idea may be given).....

.....

.....

.....

Facial aspect .....

.....

If case resulted fatally, please give post mortem findings and send the spleen to the laboratory sealed up in a sterile vessel.

If conditions suggested typhoid primarily when could a certain clinical diagnosis have been made?.....

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What is diagnosis now from clinical aspect alone?.....
Has patient had typhoid fever before, if so, when?.....
.....
Remarks .....
.....
.....

It is requested that later specimens be sent in from this case fortnightly if possible.

Return this when filled out to the laboratory.

CHOLERA ASIATICA.

In any case in which symptoms suggestive of this disease arise, a small amount of the watery stools should be sent to the laboratory as quickly as possible, in the following way:

A two to four-ounce wide-mouth bottle, with a perfectly fitting stopper, after thorough cleaning, should be boiled for fifteen minutes (both stopper and bottle). The faecal material should be placed in the bottle, and the stopper securely inserted. If any doubt exists as to a possible contamination of the exterior of either bottle or stopper, it should be properly washed off with and thoroughly disinfected by corrosive sublimate (1-1000) or carbolic acid (five per cent) to either of which 0.5 per cent hydrochloric acid has been added.

The following information must accompany the specimen:

Date and hour when specimen was taken.
Name and address, age and sex of patient.
Name and address of physician desiring report.
Name and address of health officer.
Supposed source of infection.
Number of motions in last twenty-four hours.
Time elapsed since first symptoms appeared.

It is usually possible in twenty-four hours to give a provisional diagnosis, and within thirty-six to seventy-two hours to know positively whether the vibrio of Asiatic cholera is present.

TUBERCULOSIS.

Human.—This is a disease in which a physician, if he be properly equipped with microscope and stains, can make his own diagnosis; and it is also a disease which, even after a bacteriological examination has shown the presence of *Bacillus tuberculosis*, is not quarantinable under our present state laws. Further, an immediate report on the results of an examination is not ordinarily as necessary in this as in quarantinable diseases.

Private consultants in this branch of work have repeatedly objected to the gratuitous examination of sputum and other ma-

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terials for the presence of *B. tuberculosis*. It is contended that unless information obtained from such examinations is utilized in the interest of public health, it is a matter of private interest, and fit subject for private examination only.

In consideration of the foregoing facts, the state board of health, at its quarterly meeting, held Jan. 11, 1898, decided to make no more examinations of sputum, except where local health boards adopt a regular procedure, looking toward the surveillance of the disease, the education of the public in relation to it, and the disinfection of all articles (clothes, furniture, rooms, etc.) possibly contaminated by the patient. (For such a set of rules, regulations, etc., see Report of New York City Board of Health, in relation to pulmonary tuberculosis, 1897.)

When such a set of rules and regulations has been adopted by a local board and submitted to the state board of health for approval, examinations for such local board will become a routine matter.

When, under the above conditions, a mere microscopic examination of sputum is desired, the following blanks are furnished on application:

DATA TO ACCOMPANY SPECIMEN FOR TUBERCLE EXAMINATION.

Collect morning sputum in a clean wide-mouthed bottle, shake it thoroughly with five times its bulk of clear and colorless five per cent solution of carbolic acid, pack securely and forward to laboratory with the following data, *in full:*

Date and hour.....

Patient's name ..... Address.....
Physician's name ..... Address.....
Health officer's name..... Address.....
Has this case been reported on before?.... If so, give previous Case No....
Patient's age ..... Sex..... Temperature.....
How long since disease commenced?.....
Remarks .....
Physician's diagnosis ..... Do you desire telegraphic report?.....

The addition of the carbolic acid is necessary since its presence (a) prevents the development of putrefactive bacteria during transit; (b) the tubercle bacilli, if present, are rendered innocuous; and (c) more easily stained by carbol-fuchsin (the stain usually employed in this laboratory for the demonstration of tubercle bacilli). The carbolic acid will preserve the sputum in such condition that the tubercle bacilli, if present, may be demonstrated at any time for months afterwards.

Copies of the following are sent to the physician reporting the case, to the local health officer, and to the secretary of the state board of health:

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REPORT OF EXAMINATION OF SPUTUM FOR TUBERCULOSIS.

Case No..... Received.....
Patient's name ..... Address.....
Physician's name ..... Address.....
Health officer's name ..... Address.....
Previous Case No.....
Remarks .....
Reported..... Result of Examination.....

Should the necessity arise for the examination of other fluids, or of tissues, for the presence of *B. tuberculosis*, special information and sterilized receptacles will be provided on showing such necessity.

LEPROSY.

Where a bacteriological examination in a case of supposed leprosy is desired, material may be sent as follows:

(a) A nodule or portion of a nodule may be removed and dropped immediately in ninety-five per cent alcohol.

(b) A nodule may be cut into, and the freshly cut surface scraped and smeared upon several clean cover slips, allowed to dry, then fixed by dropping into ninety-five per cent alcohol. After keeping in the alcohol for at least three hours, the smears should be dried, packed and forwarded.

(c) Scrapings from ulcers or pus may be smeared, and treated as in (b).

Data as follows must accompany, or precede, the specimens, (which must be labeled with the name and address of patient, health officer and physician),—age, sex and birthplace of patient, duration of disease, general clinical history, and site from which specimen was secured.

BACTERIOLOGICAL EXAMINATION OF WATER.

The bacteria of typhoid fever, Asiatic cholera, anthrax, and possibly of hog cholera, have occasionally, though rarely, been found in drinking water, which may have been the source of these diseases in men or animals. But it is a long and exceedingly difficult process to isolate the infecting bacteria from such a source. The examination of even those specimens which there is good reason for believing are contaminated, unless they have been collected and forwarded with the greatest care, is always fruitless. In view of the above, the following course will hereafter be adopted, and no examinations made under any other conditions:

Whenever an epidemic of any of the above diseases occurs in a community, and clinical evidence points strongly to a common

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water supply as the source of the infection, the local health officer may collect and forward all such clinical evidence, together with diagrams of the water supply and all neighboring sources of filth, the slope of the surface of the ground and underlying rock, the character of the soil, and also such other information as may seem to him to bear on the question involved.

If, then, upon a careful consideration of all the conditions so represented, it appears advisable to undertake an examination, a bacteriologist will be sent from the laboratory, to go over the ground with the local authorities and to collect and forward specimens.

DISEASES OF ANIMALS.

Examinations in diseases of animals are made on the recommendation of the director of the veterinary department of the state board of health. Specimens may be sent direct to this laboratory in accordance with the "General Directions," page 183. At the same time the sender must communicate also with the director of the veterinary department.

ANIMAL TUBERCULOSIS.

The possibility of diagnosis by the use of tuberculin renders bacteriological investigation usually unnecessary. When in the opinion of the director of the veterinary department of the state board of health or of the field veterinarian a microscopic or cultural investigation seems necessary, he may order specimens to be sent to the laboratory. As the method of procedure will obviously vary with the nature of the examination desired, upon application to the laboratory instructions and the necessary materials will be furnished for the proper collection and sending in of specimens.

Where time will not permit of a preliminary communication, as large a piece of tissue as possible should be aseptically removed (avoiding the use of any chemical antiseptics), packed and sent in the manner noted under "General Directions," page 183.

In all instances, all possible information relative to the case must be furnished before investigation can be commenced.

RABIES.

This disease has been shown to be of more frequent occurrence in this state than was formerly thought to be the case.

When an animal dies of suspected hydrophobia, during cold weather, the head and neck should be removed entire, allowed to

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freeze, packed securely, and sent at once to the laboratory in the quickest possible manner. In warm weather, the head and neck may be shipped so packed in a large quantity of ice, in a tight box as to prevent leakage, or, if this is impracticable, the brain and upper portion of the spinal cord should be removed in as aseptic a manner as possible, placed at once in pure glycerine in a clean sterile glass vessel, and the whole immediately forwarded to the laboratory. Such specimens shcuild invariably be accompanied by *all the data* at the command of the sender. (When specimens are received, susceptible animals are inoculated, and positive diagnostic symptoms appear usually, if at all, in from three to six weeks.)

GLANDERS.

Here, as in bovine tuberculosis, the use of the dead culture extract (in this case mallein) renders diagnosis comparatively easy, as a rule, without the necessity for bacteriological study. Where such necessity exists in the opinion of the director of the veterinary department, the field veterinarian, or the executive officer, he may order specimens sent in the following manner:

As large a piece as possible of lung, gland or other organ, or some of the nasal discharge or pus, should be aseptically obtained, packed and forwarded in accordance with "General Directions," page 183.

If no preliminary correspondence has occurred, the fullest details concerning the symptoms, post mortem findings, if any, every step taken in the collection and forwarding of the specimens (nothing is too unimportant to mention), must accompany or precede the specimen.

When specimens are received susceptible animals are inoculated, and positive diagnostic symptoms appear usually in from a week to ten days.

It may be then necessary to make further cultural examination, so that some further delay may ensue.

ANTHRAX.

Where this disease is suspected, an infected animal should either be killed or immediately after death has occurred from the disease, the abdomen should be opened and the spleen removed as aseptically as possible without the use of chemical antiseptics.

The whole organ if possible, or if not, a piece at least two inches

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in each diameter, should be packed and forwarded in accordance with the "General Directions," page 183.

All possible data as to the history of the epidemic (if one exists), clinical history of the case to be examined, and post mortem findings must accompany or precede specimens.

If directions are followed in every particular, a diagnosis should be possible in a week or less.

SYMTOMATIC ANTHRAX.

Where an examination by the laboratory is necessary immediately after the death of the animal, a piece of the diseased tissue (the original seat of inoculation if possible) should be removed, packed and forwarded in accordance with "General Directions," page 183.

All data obtainable as to the clinical history of the case and post mortem findings must accompany or precede specimens, which should be labeled.

ACTINOMYCOSIS.

Where a laboratory examination of specimens from this disease is deemed necessary by the director of the veterinary department of the state board of health, the field veterinarian, or the executive officer, a part of the organ most affected, such as tongue, gland, lung, jaw bone, or some of the discharge containing granules, may be collected, packed and shipped to the laboratory in the manner noted under "General Directions," page 183.

Although it is preferable that specimens be received fresh where it is impossible to secure this by packing in ice, a nodule or piece of material likely to show the presence of the micro-organism may be placed immediately in about ten times its bulk of ninety-five per cent alcohol, and sent to the laboratory.

HOG CHOLERA.

When, during an epidemic, in the opinion of the director of the veterinary department of the state board of health, the field veterinarian, or the executive officer, a laboratory examination is necessary, he may order specimens forwarded as follows: One of the animals most affected should be killed and portions (at least three inches in diameter) of the lungs and liver, the whole of the spleen and one kidney aseptically removed. *No chemical antiseptic should be employed.*

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Each piece of tissue should be packed, as soon as removed, by itself, and shipped to the laboratory in the manner noted under "General Directions," page 183.

All data in the possession of the person desiring the investigation, with reasons for asking the examination, should accompany or precede the specimens.

The list just given is not, by any means, complete, and it may be here stated that the laboratory is anxious to aid in the investigation of all obscure contagious diseases of men or animals; although, naturally, the routine work must be principally in connection with diseases which are quarantinable, or in which a report to the health officer is required.

Communications concerning diseases not herein specified will be answered, and if anything can be done towards aiding in diagnosis or in detection of the possible source of the contagium, instructions will be furnished.

Where the nature of the question does not admit of previous correspondence, it must be remembered that all available data must be sent, and the specimens collected and forwarded in accordance with the methods under "General Directions," page 183.

F. F. WESBROOK,
Director.

Submitted to and recommended for adoption by the executive committee 1898. Adopted by Minnesota State Board of Health, 1898.

H. M. BRACKEN,
Secretary and Executive Officer.

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QUARTERLY REPORTS

FROM THE

VETERINARY DEPARTMENT, 1897-1898.

March 31, 1897.

It seemed best to secure as accurate information as possible concerning the location and prevalence of certain contagious diseases of animals, especially hog cholera and glanders, before attempting to deal with them in any radical way. For this purpose I sent out, after our January meeting, the following circular letter:

....., 1897.

Dear Sir: The state board of health wishes to collect data concerning the prevalence of hog cholera and swine plague in Minnesota during 1896, so as to have a fairly accurate survey of the field before attempting measures looking toward more rigid control and possibly ultimate eradication of these diseases.

Will you aid us by answering the following questions and promptly returning this letter to the undersigned?

Make all estimates conservative; but please make something of an estimate if you are in position to do so.

Did any serious swine disease appear in your county during 1896?.....

Number of outbreaks in the county during 1896?.....

Estimate of total loss in the county during 1896? $.....

Estimated number of hogs that died in the county during 1896 from any infectious diseases.....

Return to M. H. REYNOLDS,
St. Anthony Park, Minn.

A similar circular letter of inquiry was sent out relating to glanders.

These letters were addressed to about five prominent stockmen living in different portions of each county. Eight hundred and five

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such letters were sent, and three hundred and twenty-seven replies have been received. The loss for each county was reached by averaging the different estimates received for that county. By summing up the information received in this way from a large number of stockmen scattered over the state, I have secured the following data. These figures are offered as giving only approximate estimates:

It should be borne in mind that these are not my estimates, but the estimates of the stockmen of the state. I have already been quite severely criticised by a certain paper in one of the counties for having reported hog cholera in that county. This paper became very indignant, and insisted that there was not, and had not been, any hog cholera in the county. The estimate on which my statement was based came from a very prominent stockman, and I take it for granted that an intelligent stockman would be better informed as to the prevalence of hog cholera than the editor of the paper in question. I am forced, therefore, to believe that there was hog cholera in the county referred to during 1896.

HOG CHOLERA.

ESTIMATED LOSS FROM HOG CHOLERA IN 35 COUNTIES DURING 1896.

Aitkin	$3,000	Nobles in one township)	4,200
Blue Earth	750	Olmsted	2,000
Brown	45,000	Polk	750
Carver	5,000	Ramsey	6,000
Chippewa	350	Redwood	1,100
Cottonwood	500	Rice	4,000
Dodge	500	Rock	120,000
Faribault	49,000	Sherburne	250
Fillmore	250	Sibley	8,000
Freeborn	97,500	Stearns	500
Houston	200	Wabasha	425
Le Sueur (in one twp $20,000)	51,250	Waseca	27,500
Lyon (in one township)	1,400	Washington (in one township $1,250)	1,800
McLeod (in one twp $1,000)	5,000	Watonwan	15,000
Martin	250,000	Winona	1,800
Mille Lacs	250	Yellow Medicine	300
Mower	15,000		
Murray	9,166		
Nicollet	19,750	Total	$746,891

I am pleased to report, in connection with hog cholera, the successful outcome of two experiments in the matter of quarantine when the disease appeared in previously uninvaded territory. The first case referred to appeared on the state experiment farm. I cannot easily imagine a more difficult place on which to preserve satisfactory quarantine regulations than in so public a place as this state farm. We have had hundreds of visitors since this outbreak

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appeared, the neighboring farmers coming to see us frequently, and yet there has been absolutely no spread of the disease. The quarantine has been enforced with but little inconvenience.

The same results were accomplished on the farm of a prominent breeder in Washington county. He had a very valuable herd of pure-bred Yorkshires. There had never been any hog cholera on this farm until some two weeks after a visit from an intending purchaser, who had been looking over herds in another county. The conditions for quarantine here were fully as difficult as would be met with on any ordinary farm, and yet there has been no spread from this outbreak.

It has been held by prominent stockmen that it was not practical to quarantine hog cholera as we would smallpox or diphtheria. I firmly believe from these and other experiences that this method is entirely practical in the early history of each outbreak, and good results can be accomplished without unreasonable inconvenience, and with little added loss for the owner. I have recently written Dr. Stalker of Iowa, who was for many years state veterinarian, and who has had years of experience in dealing with this very trouble. I have entire confidence in his business and professional judgment. His reply was to the effect that, with good legislation, it is entirely practical to quarantine and control hog cholera, even in so large a state as Minnesota.

SUGGESTIONS FOR DEALING WITH HOG CHOLERA.

We can control new outbreaks as they appear; not all of them, perhaps, but most of them. We can draw a line around a certain block of counties in the southern portion of the state, and recognize this district as generally infected with hog cholera, and prohibit the shipping out from this district to any other part of the state, and can also prohibit the unloading of hogs from this district in transit through the state.

We can quarantine against Iowa and Nebraska, from which states we have been constantly receiving fresh supplies of infection. Practically all the infection that we have from this disease has come from these two states.

We can distribute printed matter to intelligent farmers all over the state, and ask them to further distribute to their immediate neighbors, and thus scatter information relating to this important subject. We can coöperate with the state farmers' institutes in this work of getting the farmers interested in the dangers from this dis-

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ease and in teaching them how to protect themselves against it. We can do independent missionary work in this line. I will soon have ready a small circular, or press bulletin, on this subject for general distribution throughout the state.

GLANDERS.

ESTIMATED LOSS FROM GLANDERS IN 18 COUNTIES DURING 1896.

Becker	$250.00	Pipestone	150.00
Chippewa	262.50	Ramsey (St. Paul only)	1,100.00
Cottonwood	50.00	Rice	5,000.00
Crow Wing	200.00	St. Louis	300.00
Douglas	300.00	Stearns	200.00
Fillmore	35.00	Wadena	100.00
Jackson	250.00	Winona	80.00
Kittson	600.00	Yellow Medicine	50.00
Marshall	500.00		
Otter Tail	200.00	Total	$9,727.50

From Jan. 1 to April 1, 1897, glanders has been reported in eleven localities, representing thirty-six cases. Of these thirteen have been killed, three released, and the disposition of the remainder has not yet been reported.

No reports relating to glanders have been made from the St. Paul or Minneapolis commissioners of health since January 1st, so that the figures for this quarter do not include cases in these two cities.

BOVINE TUBERCULOSIS.

I am pleased to report that the demand for tuberculin is rapidly increasing. One of the most encouraging features in this work is that calls for tuberculin are coming in from the smaller cities over the state, such as Northfield, Faribault, Hastings and St. Peter. There is undoubtedly a serious prevalence of bovine tuberculosis throughout the state, but with opposition to the use of tuberculin passing away the outlook for the detection of this disease is more and more encouraging. I have to report the following distribution of tuberculin in the state board of health work from the secretary's office since January 1st:

Kenyon, Goodhue county	24 c. c.
Owatonna, Steel county	8 c. c.
Waseca county	32 c. c.
Northfield, Rice county	210 c. c.
Ramsey county	223 c. c.
Long Prairie, Todd county	24 c. c.
Crookston, Polk county	360 c. c.
St. Peter, Nicollet county	250 c. c.

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I would like to make a suggestion at this point. Last January the veterinary division of the university experiment station undertook the task of introducing certain vaccines into this state. It was done as a matter of convenience for the veterinarians and stockmen of this state, that there might be a distributing center, and a place for affording necessary information as to their use. We have kept on hand a small stock of tetanus antitoxine, black leg vaccine, anthrax vaccine, tuberculin and mallein, for sale at the same price as purchasers would have to pay if they should send East for these goods. The station is able to purchase these goods, by contract, at a slight reduction below retail prices, and this small profit pays for the necessary stationery and certain minor expenses involved in handling the vaccine. The work is quite self-supporting. These products are all for use in dealing with infectious diseases of animals, and the work involved in handling them easily belongs to the infectious diseases division of my work. This movement has been very kindly received by stockmen and veterinarians of the state, and the demand for these goods is rapidly increasing. I would suggest that, if the station officers will consent, at the expiration of said contract the whole work be transferred to the state board of health, and that thereafter I should distribute these goods as a member of the state board of health, rather than as a member of the state experiment station corps.

The following letter has been sent to a number of prominent stockmen, and to all the veterinarians in the state, calling their attention to this movement on the part of the station:

St. Anthony Park, Minn., Jan. 24, 1897.

Dear Doctor: I take pleasure in announcing to you that this station will from this date keep a stock of tetanus antitoxine, tuberculin, mallein, black leg and anthrax vaccine, and will sell them at a rate uniform with the Pasteur Vaccine Company prices. This is done wholly as station work, for the convenience and benefit of the veterinary profession and of stockmen in the state, and to urge the introduction and use of these agents. The veterinary division will only aim to cover the actual handling expenses.

We have now on hand the tetanus antitoxine and black leg vaccine, and will have a small stock of tuberculin and mallein soon, to be increased as the demand justifies. A stock of anthrax vaccine will be ordered in the early spring. The price of tuberculin, antitoxine and anthrax vaccine are reduced until May 1st, after which the price of anthrax vaccine will be raised a little. This antitoxine will retain its active properties for at least nine months, if kept in a cool place and excluded from light, and is not injured, so far as

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known, by freezing. Mallein and tuberculin retain their active properties for about the same period, and, being glycerine extracts, do not readily freeze. These should also be kept in a cool, dark place, and diluted with one-half per cent carbolic solution, so as to make a ten per cent solution of the tuberculin or mallein for injection.

Should you have occasion to use any of these, please let the writer know of your success and failures, if you should be so unfortunate as to have any of the latter. Allow me to suggest that tetanus antitoxine has not been fully satisfactory in the treatment of acute cases; but seems quite satisfactory in the slower cases, and as a preventive when there is reason to expect tetanus.

PRICES.

Tetanus antitoxine (in 10 c. c. vials) per vial	$1.00
Black leg vaccine (in packages of at least ten full doses each) per full dose	.20
Anthrax vaccine (in tubes of ten full doses each or more, 20c. per dose until May 1st, then 25c. per dose. This includes both lymphs also.	
Tuberculin 1 c. c. (four to five doses)	.75
Tuberculin 5 c. c. (twenty to twenty-five doses)	3.00
Tuberculin 10 c. c. (forty to fifty doses)	5.00

Make all orders payable to Dr. M. H. Reynolds, St. Anthony Park, Minn. Orders must be accompanied with the cash.

Paste this up in your office. You will wish to refer to it some day.

Very respectfully,
M. H. REYNOLDS, M. D., V. M.,
Veterinary Division, Experiment Station.

Very absurd charges have been made against tuberculin, as, for instance, that its injections caused the disease symptoms which appeared on post mortem examinations, although it was published freely to the world that tuberculin was filtered through porcelain, and, in addition, heated to so high a temperature that all the germs must have been killed, making it impossible for either living or dead germs to remain in the fluid which was injected. Others said that it generalized the disease, and made acute and rapid the disease changes; or, in other words, changed chronic and latent cases into acute and dangerous ones, and so tended to spread the very disease which it was intended to control. But this has been disproven by hundreds of thousands of tests, and shown to be an insignificant factor, if, indeed, it ever occurs.

It has taken us four years to disprove this statement, and meantime the work has been seriously delayed. Intelligent people, and

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especially medical men themselves, should not be so ready to accept mere statements of opinion—statements that are written to ventilate personal views, and which rest on no satisfactory experimental data. Brilliant generalities are sometimes very pleasant to hear and to read about, but they ought not to be given ready credence when they involve such large and serious problems as that of tuberculosis. It has been this same dogmatic statement, based on no adequate supporting evidence, that has hitherto delayed the general use of tuberculin in human practice for purposes of early diagnosis —a thing to be earnestly hoped for and expected in the future.

It has also been charged that tuberculin was inaccurate, condemning sound cattle and passing diseased ones, in spite of an enormous amount of competent evidence that it was the most accurate diagnostic agent ever known in the history of medicine. Others objected, saying that it was too accurate, because it condemned cattle but slightly diseased. Others objected on the ground that tuberculosis was evidently so widely spread and so common among cattle that we could do nothing with it anyway, and that we ought therefore to sit down and give up the struggle as hopeless.

A study of the percentages that have been found in Minnesota cattle may not be uninteresting in this connection:

PERCENTAGES IN MINNESOTA CATTLE.

PREVALENCE ACCORDING TO CLASS AND CONDITION.

	Class.	No. of Herds Tested.	No. Animals Tested.	No. Reactions.	Per cent Tuberculous.
1	Natives	137	2,839	223	7.8
2	High grades	5	157	17	10.8
3	Pure breds	6	258	43	16.6
4	Farm herds	38	694	99	*14.2(7.8)
5	City dairy herds	108	2,736	284	10.4
6	In "good" general condition of stable	57	1,370	139	*10.1(6.8)
7	In "fair" condition of stable	59	1.140	83	7.28
8.	In "poor" condition of stable	32	864	165	19.1
9	With "good" ventilation	45	1,011	99	*9.8(5)
10	With "fair" ventilation	45	1,087	67	6.16
11	With "poor" ventilation	48	1,210	201	16.6

NOTE.—Fifty-five of these tuberculous animals in each case (Groups 4, 6 and 9) were from the same two herds. Eliminating these two herds from Groups 4, 6 and 9, the percentages are reduced respectively to 7.8, 6.8 and 5.

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The data submitted in this table were collected in the most impartial way that could be devised, and not with a view to establishing any theory or promoting any argument, but is merely a showing of cold facts, and is offered for whatever it is worth, not as proving anything, but merely as so much circumstantial evidence. All grading and classification was made by the same person and according to a definite standard.

The showing of this table is what any student of sanitary matters should expect. The better the sanitary conditions, the smaller the percentage of tuberculosis, and yet Groups 4, 6, and 9 show that tuberculosis may prevail to a serious extent under good conditions of stabling and care when herds are founded upon tuberculous stock or when owners introduce the disease while trying to improve their stock. This table must not be taken to mean that farmers should not try to improve their stock, but it does suggest that it is unwise to attempt to do this by introducing tuberculous animals, no difference how long the pedigree or how fine the beef or dairy form. Neither must this table be read as saying that a man should not found a herd of pure breds, but it does suggest that it is unwise to found such a herd upon tuberculous stock. That it is possible to have a vigorous and nontuberculous stock of pure breeding is proven by numerous herds of such cattle scattered here and there over the country which have been tested by this station, and by other stations and private veterinarians, and found sound.

As for the conditions in "good," "fair" and "bad" stables, in general, and the "good," "fair" and "poor" ventilation, the figures of the table speak so plainly that comment is unnecessary.

The herds for which figures are given in this table are fairly representative ones. The per cent tuberculous of 3,430 animals tested is 11.1, but this must not be taken as representing the cattle of Minnesota, for it will be seen that few farm herds have been tested as compared with the number of breeding herds and city dairies.

The figures here given should be taken as estimates of certain classes only.

General experience supports the data shown in the preceding table. Finely bred herds and the city dairy herds show the largest percentages, and farm herds of native stock kept under ordinary farm conditions show small percentages.

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A TABLE OF TUBERCULIN TESTS.

Herd Number.	No. Animals Tested.	No. Reacted.	Per Cent Tuberculous.	No. Retested.	No. Retests.	Breeding.	Kind of Tuberculin Used.	No. of Post Mortems.	No. Proven Tuberculous.	Remarks.
1	159	45	28.3	56	361	Mixed.....	Bu.....	40	40	Founded with tuberculous stock
2	16	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
3	33	33	39.8	1	2	Shorthorn..	Bu.....	13	11	Writer did not see post mortem.
4	42	3	7.1	.....	.....	Mixed.....	Bu.....	.....	.....	
5	39	11	28.2	.....	.....	Mixed.....	Bu.....	5	5	
6	31	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
7	19	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	Cow dealer.
8	7	.....	.....	.....	.....	Jersey.....	Bu.....	.....	.....	
9	11	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
10	23	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
11	20	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
12	17	3	17.1	.....	.....	Mixed.....	Bu.....	3	3	
13	27	3	11.1	.....	.....	Mixed.....	Bu.....	.....	.....	
14	42	5	11.9	.....	.....	Jersey.....	Bu.....	2	2	The remaining three that reacted were isolated for experimental work.
15	18	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
16	30	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
17	46	2	4.2	.....	.....	Mixed.....	Bu.....	.....	.....	
18	33	3	9.6	.....	.....	Mixed.....	Bu.....	2	2	
19	34	3	8.9	.....	.....	Mixed.....	Bu.....	.....	.....	
20	25	8	34.0	.....	.....	Mixed.....	Bu.....	6	6	
21	6	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
22	1	.....	.....	.....	.....	Jersey.....	Bu.....	.....	.....	Family cow.
23	4	1	25.0	.....	.....	Mixed.....	Bu.....	1	1	Feeding steers.
24	2	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	Stable very damp.
25	26	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	
26	2	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	Steers slaughtered.
27	2	.....	.....	.....	.....	Mixed.....	Bu.....	.....	.....	Steers slaughtered.
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	
	772	120	.....	.....	363	.....	.....	71	70	

As will be seen by reference to the above table, twelve of the total twenty-seven herds tested were more or less tuberculous, and the percentages varied in different herds, from 0 to 39.8, the latter being the highest found in any herd thus far tested by this station. Many workers elsewhere have found eighty and even ninety per cent of the animals in large herds tuberculous.

As to the accuracy of tuberculin as a diagnostic agent, our experience in Minnesota makes the following showing: In seventy-one post mortems, seventy animals were proven tuberculous. I did not witness the post mortem in the case where tuberculosis was not shown, but have no question but that the work was carefully done. The animal was a large short-horn bull, in good flesh and gave a peculiar reaction. The temperature at 10 a. m. was 100.8 and at 12 m. 104.2 and then 105.8 at 2 p. m., and remained at about 105 until the last temperature at 10 p. m. The post mortem was made by a very careful veterinarian, in whom I have full confidence, but no post mortem which depends on the human eye and human sense of touch can be absolutely correct. I do not believe that tuberculin

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is infallible, but that is more accurate than any macroscopic post mortem can be, and that in those few cases where we find no apparent lesions of tuberculosis the operator is more apt to be at fault than the tuberculin, I am convinced.

This particular bull may or may not have been tuberculous, but the inference that he was so diseased is further strengthened by the fact that this occurred in a large herd of well bred cattle of which over thirty per cent were tuberculous, as shown by the test and by subsequent post mortems.

WHAT OTHER COUNTRIES ARE DOING.

In July last the federal council of Swizerland sent a circular to all the confederated states, concerning tuberculosis among catttle, This circular recites that this action was taken in response to numerous petitions from cantonal governments and agricultural societies, asking that, since tuberculosis is recognized as a contagious disease, and since tuberculin has proven an accurate diagnostic agent, tuberculosis be combatted by the sanitary authorities.

Among the various provisions of this circular, the government offers to furnish the tuberculin free to the various local governments, and to pay half the cost of making the tests; the tuberculin to be used only by veterinarians who hold diplomas and to be employed by them according to prescribed regulations. If an owner wishes to have any portion of his herd tested under these provisions he must have the entire herd tested. Cattle that react must be marked with a tag in the ear. Owners are urged to separate the healthy animals from those that react, and to boil the milk of tuberculous cows before using it for any feeding purpose. This circular also takes the ground that some animals may react and still be useful for breeding, production of milk, or for fattening. Some points worthy of note in this circular are, that tuberculin is furnished gratuitously, that half the expense of test is borne by the general government, that no partial herd tests are allowed, and that all cattle that react must be permanently branded. The sound cattle may be branded or not, at option of the owner. This plan is open to criticism, but on the whole marks a good step forward.

Denmark is dealing with this problem of bovine tuberculosis on a somewhat different plan. The government furnishes the tuberculin upon application, and the services of veterinarians for testing the young cattle. If the owner wishes to have his whole herd tested, he pays the additional fee to the veterinarian for testing the older

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cattle. Dr. Bang has found it very desirable that whole herds should be tested, and has encouraged such action. Animals selected for early slaughter may be omitted from the test, and are inspected at the place of slaughter. The law forbids the use of uninspected meat from tuberculous cattle, and the use of milk from tuberculous cows that have diseased udders. The plan of dividing the tuberculous herd into two parts, placing those that react in one herd and those that do not react in the other, and putting these into separate barns, or into carefully partitioned portions of the same barn, is encouraged. Badly diseased animals and certain others are killed at once. Infected cows may be used for breeding purposes under certain conditions. They must be kept quite separate from the sound cattle. Their calves are taken from them at birth and kept with the healthy cattle, and reared on milk from healthy cows or on milk that has been sterilized. When a cow in the tuberculous division reaches an advanced stage of the disease she is killed. In this way the sound herd constantly increases and the tuberculous herd decreases in numbers.

France is attempting to deal with this question, also, but the plan in operation is as yet very incomplete and imperfect. However, there are some good points in the French plan worthy of note. No cattle can be brought into France unless shown by the tuberculin test to be free from tuberculosis. When an animal is found presenting outward evidences of tuberculosis, or when one is found tuberculous at slaughter, the herd from which it came is tested. The owner has an option regarding the cattle that react. He may have them slaughtered at once, and receive compensation from the government, or he may keep them isolated for six months. At the end of this period they must be slaughtered under government inspection. If now the carcass is condemned the owner loses. One excellent feature in the French plan is that all slaughter houses are under government or city supervision, and the carcasses are there inspected by public officials; a plan that should be adopted in the near future by all the larger American cities.

It may not be out of place in this connection to report some experiments with tuberculin at the university experiment farm.

An experiment with tuberculin was begun at university farm, in October, 1894, for the purpose of getting light on certain disputed points with reference to the use of tuberculin as a diagnostic and curative agent. This experiment included eleven head of cattle of various breeds and ages. Three were Shorthorns, two were Jersey, three Polled Angus, one Holstein, one Red Polled, and one native.

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They showed, upon subsequent post mortems, various stages of tuberculosis. (See page 360.)

We hoped to answer or get light upon the following questions:

1. Is tuberculin an accurate diagnostic?

2. Under what circumstances, if any, may a tuberculous animal fail to react?

3. Is tuberculin injurious to sound cattle?

4. Is tuberculin injurious to tuberculous cattle?

5. Has a cure or has merely an immunity to the tuberculin been effected in those cases in which the patient fails to react after one or more injections?

6. What is the diagnostic value of retests as compared with the first?

7. Can a reasonably accurate estimate be made of the extent or location of the disease from evidence given by the tuberculin test?

8. Is the test reliable in the case of advanced pregnancy?

9. Has tuberculin any therapeutic value in bovine tuberculosis?

The results of this experiment point to the following conclusions:

1. Tuberculin by hypodermic injection is so accurate as a diagnostic agent for bovine tuberculosis as to be thoroughly practical.

2. Tuberculin may fail to indicate the presence of tuberculosis in cases where the disease changes are advanced and general.

3. Tuberculin by hypodermic injection is not injurious to the health of sound cattle, even in very large doses.

4. Tuberculin by hypodermic injection is not injurious to the health of tuberculous cattle in doses of (bureau tuberculin) from 1 c. c. per 500 pounds live weight, which is the ordinary test dose, up to 1 c. c. per 250 pounds, which would be an unreasonably large dose for either diagnostic purposes or for treatment.

5. Cattle sometimes fail to react after one or several injections. In such cases cures may have been effected, or the animals may have become insusceptible to the agent, and may still remain infectious.

6. It is evident that an animal may remain tuberculous and infectious after several injections of tuberculin, or be badly diseased and yet refuse to react.

7. The diagnostic value of retests is therefore much less than the first, and such subsequent tests must be considered inaccurate.

8. Of those which showed extensive disease of the lungs and attached glands, about seventy per cent gave a distinct rise of temperature within ten hours and a maximum of 3.5 degrees or over. Conversely, of those which gave a distinct rise of temperature with-

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in ten hours and a maximum of 3.5 degrees or over, about seventy per cent showed extensive disease of the lungs and attached glands when bureau tuberculin was used in doses of 1 c. c. per 500 pounds live weight. Due care was exercised as to time of watering, temperature of stable, exercise, nervous excitement and the various factors which may influence the temperature of the animals undergoing test.

It has also been frequently noticed, but may not hold true when larger statistics are shown, that animals which are extensively diseased, and especially if the lesions were of long standing, often give low reactions, or none at all.

9. The tuberculin test may be uncertain in cases of advanced pregnancies, but not otherwise objectionable.

10. Tuberculin may have a distinctly curative effect in cases of recent infection, or where the lesions are limited in extent, and it may increase the tendency toward recovery in other cases. Out of eleven cases treated two recovered. Two others showed evidence of recent repair in diseased tissues.

The physical condition of all the animals was excellent throughout the experiment. In several cases there was a decided gain in spite of the ordinary food and indifferent care which were purposely given.

Dr. De Schweinitz reports (Bulletin 13, United States Department of Agriculture, page 17) the case of an animal that received about 3000 c. c. tuberculin during a long period, and finally recovered from the tuberculosis.

LEGISLATION.

Inasmuch as the help which we have asked at the hands of the legislature during the past winter has dealt largely with veterinary matters we have thought best to put it on the ground of a stockman's bill, rather than as being a board of health bill. It seemed necessary for me to take quite an active part in this work, and I have done so. This perhaps has interfered with both my college and station work, and also with my board of health work, but I do not regret the time so spent, for I am able to report success, and that we have secured a satisfactory law dealing with infectious diseases of animals, and an increase of annual appropriation for that work of $3,000, giving us a total of $6,000.

I wish to urge upon the attention of this board the fact that we owe this success very largely to the earnest support we have had

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from the various stock breeders' associations, state farmers' institutes, agricultural papers, and prominent stockmen.

PRINTED MATTER.

I take pleasure in reporting that we have made some progress in this line, but not so much as I had hoped that we might make before this meeting occurred. We have issued new and separate blanks for recording tuberculin and mallein tests, also circulars of instruction for the use of tuberculin and mallein. We have had these circulars printed on the backs of the sheets for recording the results of tests. We have also issued a large sheet for recording results of herd tests with tuberculin. These latter sheets are to be kept on file in the state board of health office. The individual test blanks are to be left with the owners of the cattle.

I should like to discuss the question: What can be done with this great problem of bovine tuberculosis? and suggest some methods of controlling this disease, but I must not occupy any more of your time this afternoon. I shall hope to present a fuller study of this question at some future meeting.

I would respectfully suggest to this board the desirability of employing a field veterinarian. There is abundant work in this state, with her eighty counties, to keep such a man constantly employed.

The statistics which I have just given you show, for 1896 alone, hog cholera in thirty-five counties, with an estimated loss of about $750,000, and glanders in eighteen counties, with an estimated loss of $9,727.50. In addition to these two infectious diseases we have bovine tuberculosis present to an alarming degree in breeding and dairy herds of the state. Altogether this is a showing that deserves the serious consideration of this board at this meeting, for the condition is constantly growing worse. Our swine industry is seriously menaced by the hog cholera, our cattle interests by tuberculosis, and the prevalence of glanders among our horses is not a pleasant thing to contemplate. I believe that we can afford to employ such a competent veterinarian for this work, provided the railroads will help us by granting passes for myself and this assistant veterinarian.

This plan of having a field veterinarian is urged upon us by men who ought to be heard; such men, for instance, as John Cooper and N. P. Clark of St. Cloud, O. C. Gregg, superintendent of the state farmers' institutes, Colonel Liggett, dean of the state university agricultural college and director of the experiment station, Dr. Curryer and Major Wilcox, president and secretary of the stock breed-

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ers' association, etc. There is no question in my mind as to the desirability of our taking such action in planning our campaign against the infectious diseases of domestic animals, but there is a grave question as to whether we can afford it with our limited finances. We certainly cannot do this work as it ought to be done if we must pay this field veterinarian's salary and constant railroad fares for both of us. He will be traveling constantly, and it will be necessary for me to go occasionally. Our action must depend, therefore, to some extent on whether the railroads will help us, and it is to be hoped that we will have a larger fund some day, and be able to pay our bills, and not be compelled to ask such favors.

M. H. REYNOLDS, M. D., V. M.,
Director.

June 30, 1897.

The work during the last quarter has dealt almost exclusively with glanders and hog cholera. It is becoming evident that the state is much more seriously infected with glanders than I had at first anticipated. The map which I present shows in a graphic way the prevalence of the disease throughout the state. The red checks on this map each indicate a single horse affected with glanders. The blue checks indicate each a single outbreak of hog cholera. According to the suggestions given in the reports at the last meeting by Secretary Bracken and by myself, which reports were accepted by the board, we have employed Dr. S. D. Brimhall of Minneapolis as field veterinarian to the state board of health, and I am pleased to report that the work has been progressing favorably.

HOG CHOLERA.

I am pleased to report that our attempts thus far to quarantine the hog cholera in previously uninfected territory have been most successful. We have rigidly quarantined fifteen outbreaks, with complete success in all but two cases. In these two the disease spread from the first places quarantined, but was stopped effectually at the next stations. There has been very much less hog cholera in this state thus far in 1897 than during the same period in 1896, and I earnestly hope we may be able to reduce its prevalence very much more during the remainder of the year. I have had a number of expressions of opinion from such men as Mr. Chas.

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Kenning, Dr. Curryer, Hon. John Cooper, Mr. N. P. Clarke, Major Wilcox, Hon. S. M. Owen of the "Farm, Stock and Home," and Mr. P. V. Collins of the "Northwestern Agriculturist," which indicate that the stockmen of the state are highly satisfied with the situation.

In order to make satisfactory progress in the fight with hog cholera this fall it will be necessary for the state board to adopt some vigorous measures with reference to one portion of the state. These measures may cause inconvenience, and even loss, to a few people, but they are for the benefit of the state at large, and for the ultimate welfare of its people. There is no question but that the adoption of these rules will meet with opposition, but the storm will blow over, and if our work is successful everybody will be thoroughly pleased in the end. I am quite ready to face my share of the storm with the influential backing that is promised. I would suggest adopting the following:

RULES FOR CONTROLLING HOG CHOLERA IN MINNESOTA.*

Rule 1. The following counties were more or less generally infected with hog cholera during 1896 and 1897, up to date, and are hereby declared an infected district and designated as District A. Counties: Brown, Watonwan, Martin, Freeborn, Faribault, Blue Earth, Nicollet, Le Sueur, Waseca, Hennepin and Ramsey, excepting the state fair ground.

Rule 2. All that portion of the state not included in District A shall be known as District B.

Rule 3. Shipment of swine from any point in District A to be unloaded in District B, and all other movements of swine, whether they are driven on foot or hauled in wagons, from any point in District A into District B, are hereby prohibited.

Rule 4. All shipments from points outside of this state, to be unloaded within this state, are prohibited, except as provided in Rule 5.

Rule 5. Hogs shipped from any other state into Minnesota must be crated, shipped in other than stock cars, and accompanied by a certificate signed by a veterinarian or physician that they are free from the disease when shipped and come from an uninfected district.

Rule 6. Hogs shipped from point to point in District B must be crated and shipped in other than stock cars.

Rule 7. All outbreaks of suspected hog cholera in District B and in such places as may be deemed practical in District A shall be rigidly quarantined.

Rule 8. Shippers of hogs from point to point in District A shall be required by the railroad agent to sign a statement to the effect that such hogs are for slaughter only, and within five days after reaching destination.

NOTE.—Railroad agents should preserve all certificates demanded by these rules for the protection of their companies in case any shipment of hogs should be followed by an outbreak of disease.

Rule 9. All exhibitions of swine at county fairs in District A are hereby forbidden.

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Rule 10. All cars in which hogs are shipped into or through this state shall be constructed so as to prevent the escape of manure and litter.

These rules shall go into effect Aug. 20, 1897, and continue in force until altered or annulled by the state board of health.

N. B.—These rules do not interfere with any shipments of swine, for slaughter, into any stock yards of the state that may be located within District A, and these rules are so framed that the large markets of the state are located within District A.

[From Section 9, Chapter 233, Laws of 1897.]

Any person violating any rule or regulation made by the state board of health, or any order made by such board under the authority hereof, shall be guilty of a misdemeanor, and be punished by a fine of not less than twenty-five (25) or more than one hundred (100) dollars, or by imprisonment for not less than thirty (30) or more than ninety (90) days. Complaints for violating the provisions of this act, or for violating any rule or regulation made by any board of health under its authority, may be made by any member or authorized agent of any such board, or by any citizen of this state.

I have corresponded with a number of prominent and intelligent men connected with the swine breeders' association, stock breeders' association, state agricultural society, and with the editors of three Minnesota agricultural papers, and they have all agreed that the rules suggested, or something very similar, are practical, and that they offer reasonable promise of success. Minnesota is not so badly infected with hog cholera as is Iowa and Nebraska, and we must check the spread of this disease within the state if possible.

I recently submitted to the board of directors of the state agricultural society the suggestion that there should be no swine exhibit at the state fair this fall. The matter was carefully considered, and the board decided that it would not refuse entries to this exhibit because there had already been had an unusually large number of applications; but they instructed the secretary of the state agricultural society to notify all exhibitors that they must come with a certificate from a veterinary surgeon stating that the hogs were free from cholera when they were shipped, and were from an uninfected district. These hogs are usually shipped in crates, and I presume there is not a great deal of danger from this source.

I regret to announce that hog cholera has appeared in both the New Brighton and the South St. Paul stockyards, and it has seemed necessary to quarantine both of these yards, in so far as any shipment or other removal of hogs from these yards to be unloaded within the borders of Minnesota are concerned. In posting the original

*Adopted by the board July 13, 1897.

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hog cholera card, the government inspector at St. Paul and our state board of health inspector at New Brighton each desired some form of notice which could be served individually upon the commission men and local dealers. To assist them in this matter, I issued the following:

.....

.....

You are hereby officially notified that hog cholera exists in .....
.....stockyards. Hogs must not be shipped from these yards to be unloaded within the State of Minnesota until further notice.

Please warn the farmers and stockmen who come to you for the purpose of buying or selling that it is a dangerous matter for them to go around in these yards and then to go back to their own farms, or wherever hogs are kept, because of the liability of conveying this disease from place to place. You are invited to further coöperate with us in the work of suppressing hog cholera in Minnesota by distributing among your customers our circulars on hog cholera.

.....

.....

GLANDERS.

Since our last meeting I have had some very unusual experiences with mallein in testing for glanders. In two cases, out of eight horses in each stable, seven gave reactions. One of these stables was in Winona county and the other in Faribault county. In each case several of the reactions were with young horses and colts that we could not reasonably suppose were affected with glanders. At least there was no evidence pointing to the presence of this disease except that given by the mallein test. Both of these groups of horses were subsequently retested and in each case the accuracy of the mallein was fully established, the results comparing exactly with the results of prior tests. Prior to these cases reported we had found in one stable four out of six horses that responded to the mallein test. Lately we have had another similar experience in the northwestern part of the state, Marshall county, where seven horses in a stable of twelve gave test reactions. Several of these horses were in fine physical condition and showed no evidence of the disease, but in each of these herds there was one or more cases of undoubted glanders in the state; that is, cases which showed unmistakable clinical symptoms of the disease. These cases lead us to think that the young and vigorous horses might be very slightly affected with glanders,—sufficient to give reaction to the mallein test,—and yet so slightly that they might either recover or never develop into in-

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fectious cases. In order that we might be thoroughly informed as to what other states were doing in dealing with such cases the following letter was sent to twenty-five prominent veterinarians, especially those connected with state board of health and experiment station work.

July 3, 1897.

Dear Doctor: I write you for information concerning the rules and methods in the use of mallein which you have found practical. In your state, or other work, do you test *all* horses that have been exposed to the infection, in the stable or otherwise, with the horses that you have good reason to suppose have the glanders, or only those which you suspect may be suffering from the disease?

Have you noticed any pronounced effect, favorable or otherwise, upon cases of recent, slight or latent glanders following mallein injection?

Have you ever had a large number of reactions in a stable under circumstances which convinced you there was something wrong with the mallein, and that some or all of those horses which reacted could not have the glanders, and if so, has the mallein test been proven correct or incorrect by subsequent experience?

Under what circumstances, if any, do you consider mallein inaccurate?

Do you feel justified in ordering the destruction of *all* horses which react, or in other words, do you find cases sometimes which you think may recover and which you do not feel justified in ordering killed?

Personally I have no question but that cases of glanders occasionally recover, and so far as we have positive information on the point this may happen quite frequently, but it has not been proven so far as I am aware. We have recently tested two stables of horses in this state in the course of our state board of health work in which there were eight horses in each stable and seven in each case gave typical reactions, and these reactions were repeated on subsequent retest three weeks later. Many of these are young horses and colts, and must be but slightly diseased. The retest was made with a different sample of mallein, and so we have no question but that they were affected with glanders in a greater or less degree.

Very respectfully,

M. H. REYNOLDS.

The following is a summary of the views given by prominent veterinarians heard from up to date:

Dr. Cary of Alabama states that mallein is a most reliable agent for diagnosticating glanders, but not infallible. That it is almost as reliable as tuberculin. The value of the animal and the influence of the owners has more or less perverted the judgment of veterinarians with regard to the truthfulness of the mallein test. He states that he has seen just such unusual cases as those mentioned in my circular of inquiry, but post mortem examinations demonstrated glanders' lesions in every case.

Dr. M. Stalker of Iowa has found mallein uniformly accurate. His plan has been to test only horses that show signs of the disease.

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He has not observed any therapeutic effects from mallein injection. He believes that when a case is recognized in a stable promptly and is at once separated from the remainder of the herd and suitable precautions taken other cases rarely develop. He does not destroy horses because of exposure.

Dr. Peters of Nebraska has found mallein absolutely accurate; he does not believe that cases of glanders ever recover.

Dr. Niles of Virginia has had very little experience with mallein.

Dr. Pearson of Pennsylvania employs mallein only in cases where there is reason to regard animals with suspicion; that is, where they present symptoms thought to indicate the existence of glanders. Under these circumstances mallein has given very satisfactory results. He does not consider a rise of temperature alone as satisfactory proof of glanders. Rise of temperature *and* local swelling taken together are diagnostic. He has met with no case in which lesions are not found where both the local and general reactions appear.

Dr. Hinebaugh of South Dakota tests all horses that have been exposed to infection in the stable. All reactions have been verified by post mortems. He has found mallein entirely accurate except where the disease was in very advanced stages. He orders the destruction of all horses which react. He has never had any experience which leads him to conclude that a case of glanders has ever been cured, and thinks he would take no chances on such a possibility. If an animal reacts it gets a death certificate. He has two experimental horses on hand, each of which has been injected five times and has given five reactions.

Dr. Osgood of Massachusetts only uses mallein on horses which he has reason to suspect. He has not noticed any therapeutic effect from the use of mallein. He has known cases where horses gave distinct reactions with fresh mallein and subsequently gave years of good service and thinks they may not have been diseased. He does not feel justified in ordering the destruction of all horses which react. He thinks that if a horse has ever shown positive physical symptoms of glanders he would not dare, under any circumstances, to release such a horse as cured. He considers mallein of no value except in confirming strong suspicions.

Dr. R. R. Dinwiddie of Arkansas has had comparatively little experience with mallein, and has obtained uncertain results.

Dr. Mayo of Kansas has had comparatively little experience with mallein, and does not consider it so accurate as tuberculin.

Dr. Cooper Curtice of New York believes that mallein should be

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used on all horses in the stable when the presence of glanders in any case is reasonably certain. He thinks there is satisfactory evidence that cases of glanders have recovered, but this does not affect, with him, the status of the glandered horse.

Dr. W. L. Williams formerly of Montana, now of Cornell University, believes that all horses which have been exposed to glanders should undergo the mallein test, and that mallein should be introduced as an essential factor in commercial examination for soundness. He has found it very accurate as a diagnostic agent, and has never noticed any unfavorable effect from its use, even on horses that react. He believes that horses may be affected with glanders and make undoubted recoveries. He would be lenient under certain conditions; for instance, if a poor man had glanders among his horses, allow him the use of certain horses until after his crop was harvested, the horses kept meanwhile under conditions of easy quarantine. He believes that certain of these horses could be released from quarantine in twelve or thirteen months as cured, upon evidences given by the mallein test, and that such a course is preferable to bringing a man to pauperism or involving the state in litigation. He believes that there is usually much stronger tendency for horses in the North and Northwestern States to recover from glanders than in warm or temperate regions, and that in warm or temperate regions with great humidity of atmosphere a great majority of all cases should be immediately slaughtered. In livery or other public stables in the city glandered horses cannot, with our present knowledge, be safely used. This leaves the owner a choice between rigid quarantine and slaughter.

TUBERCULOSIS.

I am pleased to report that there has been quite an extensive call for tuberculin during the last quarter, coming mainly from the smaller cities of the state.

Something as to what other states have been recently doing in this matter of bovine tuberculosis may be of interest in this connection. In Pennsylvania important plans for the extermination of this disease are under consideration by the state authorities. A bill has been introduced appropriating $50,000 for the investigation of contagious and infectious diseases among domestic animals. Another bill to prohibit the importation of diseased cattle into Pennsylvania bids fair to pass that legislature easily. A bill requiring that all animals entering the state to replenish the dairies shall have

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been tested with tuberculin and pronounced free from the disease, or kept at the point of entry until they have been tested, has been passed by both houses and signed by the governor, going into effect Jan. 1, 1898.

The Massachusetts state legislature at its last session voted the sum of $250,000 for the cattle commission, to be used in stamping out tuberculosis and other infectious and contagious diseases of live stock. The whole country will await with interest the result of this work.

Nevada has been somewhat stirred up over this matter, because of a large shipment of tuberculous cattle from a certain Eastern man into that state. These cattle were disposed of at public sale and scattered widely over the state.

In New York the towns of Troy, Athens, Towanda and Canton have, through their local boards of health, notified milk dealers that all animals furnishing milk for the citizens of these places must be inspected by competent veterinarians and pronounced free from tuberculosis. The lower branch of the legislature has passed a bill forbidding the sale of horse flesh for food, and the state board of health has obtained an appropriation in the annual supply bill of $15,000 for the continuance of inspection of animals for tuberculosis, and $7,500 for dealing with glanders.

I think it would be well if we had a set of brief definite rules published for the use and instruction of the chairmen of town boards and other local health officers; one set of rules for dealing with glanders, another for hog cholera, perhaps one for sheep-scab and one for bovine tuberculosis. I have partially formulated sets of rules for hog cholera and glanders and will probably present them at the next meeting of the board for your consideration.

The disposal of the cattle which have been condemned by the tuberculin test in both of our large cities is certainly in a very unsatisfactory condition. It may or may not be desirable for this board to take any action in the matter at this time, but I would like to present the matter for your consideration and possible action in the future. I think there can be no question but that the present system can be easily improved without serious friction with these local authorities. Cattle are being tested in both of these cities with tuberculin, and those that react are condemned as milk producers. Condemned cattle are given certain ear tags which show them to have the disease and the owners are forbidden to sell milk from these animals. Very many of these cattle are undoubtedly slaughtered and put on the market without any post mortem inspection

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whatever, except such as they may possibly get in the local meat markets, which is of no value whatever. Would it not be practical for the state board to take some action at this, or some subsequent meeting, to the effect that all cattle condemned as having tuberculosis shall be put under quarantine by the inspector and that their slaughter shall be permitted only at certain dates and in certain places and under competent inspection?

INSTITUTE WORK.

In talking the matter over with Dr. Bracken, shortly before his eastern trip, we thought it would be very desirable to do some hog cholera institute work in the south central part of the state. Accordingly I was sent with Supt. O. C. Gregg and his corps of institute workers for two and a half weeks' work on the border of what we recognize as the hog cholera district. At the institute meetings Superintendent Gregg gave me what time I needed each afternoon to present the state board of health work. I took pains to explain the methods of the state board, the relation of the township and other local boards to the state board of health, and the duties and responsibilities of the members of the local boards. I then illustrated what should be done, in an outbreak of glanders, for example, from the first suspicion of the presence of the disease until the investigation was finally closed up. Most of my talk, however, was on matters pertaining to hog cholera, including causes.

M. H. REYNOLDS, M. D., V. M.,
Director.

CORRESPONDENCE.

September 30, 1897.

The correspondence connected with the veterinary work has increased rapidly, until at present it confines me closely to office work. I have been out in the field but few times since our last meeting.

FIELD WORK.

This work, under Dr. S. D. Brimhall, has proven very satisfactory. Dr. Brimhall's time has been occupied chiefly in dealing with hog cholera and glanders. I feel that the board has done wisely in employing a field veterinarian on full time.

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HOG CHOLERA.

The work connected with hog cholera necessarily occupies a prominent place by reason of great losses experienced by stockmen, and by reason of the great property interests jeopardized by the prevalence of this disease in the state. After the first few months of unsatisfactory work with hog cholera I concluded that the fundamental difficulty arose from the indifference of farmers and their lack of knowledge concerning the disease, and also from the astonishing indifference of many of the town boards in infected districts as to their duties.

The local papers of District A (see page 216) and of the counties adjoining A, and elsewhere in the state where the disease appeared, have been flooded all season with hog cholera literature, and editors have very kindly published matter sent them. I think that this board should acknowledge, in some public way, the generous assistance that has been given in this work by the newspapers of the state.

Postal cards have been sent to every chairman of the townships in the counties mentioned, partly to secure information and partly to stir them up and get them interested in the work. I have sent to every paper in District A copies of the "Notice" card, "Hog Cholera" card and blanks for reporting infectious diseases, together with a copy of a letter (given below), which explains the uses and methods of distribution.

To the Editor,

Dear Sir: I send you to-day samples of placards recently issued by the state board of health in an effort to control hog cholera in Minnesota. The "Hog Cholera" card is for use by health oficers and chairmen of township supervisors, in the enforcement of quarantine. But it is to the "Notice" card that I wish to call especial attention. This is issued by the state board with a view to helping owners to avail themselves of Sec. 11 of the new law, which gives owners authority to post such notices during any outbreak of contagious disease among domestic animals. This amounts to private quarantine in self-defense against careless neighbors who might bring the disease.

May I ask you to urge especially this "Notice" card upon the attention of your readers, and urge them to avail themselves of this protection, and if you can spare the space, I would suggest that a reduced copy of the "Notice" card in your paper would be very effective.

Minnesota lost last year, in 35 invaded counties, not less than $1,250,000 from hog cholera alone, and this is not the only serious item by any means. The situation is serious enough to warrant a united effort in this matter of controlling the spread of this disease.

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It should not make any difference whether hog cholera has invaded your county or not; it is liable to come, and if your county has been so fortunate as to escape thus far, you may do great good by preparing your farmer readers for its possible coming.

Copies of the law and hog cholera circular have been distributed freely through District A and the counties adjoining District A and infected counties elsewhere in the state. The following circular letter, dealing with the duties of township supervisors in case of an outbreak of hog cholera, has also been sent out quite freely.

To the Chairman of the Township Board of Supervisors,

My Dear Sir: It is the duty of township supervisors to quarantine at once all farms whereon suspected hog cholera has appeared. This quarantine must include all hogs that have been exposed to infection either directly or indirectly with those that have been sick. You will find the conditions of quarantine on the "Hog Cholera" cards sent you under separate cover.

I trust you will see to it that neighbors around the infected farms are warned of the presence of this disease, and that it is very unwise for them to go where sick hogs have been kept, and then return to their own yards or pens. It is just as dangerous for them to permit persons from the infected farms to go into or near their pens or yards for at least two months after this outbreak has disappeared.

I send you to-day a complete hog cholera file and would ask you to distribute copies of the law, and the hog cholera circular, freely in this neighborhood, especially upon the farms adjoining the ones where the disease has appeared. I think it would be wise for you to read both the hog cholera circular and the law very carefully in order that you may give the neighbors such advice as they may need. Call their attention especially to the last section of the law and see that it is enforced.

You will find in this hog cholera file several copies of the blank for reporting infectious diseases among domestic animals. Please fill out one of these for each farm whereon the disease has appeared and return to me as soon as possible. It is your duty to put up, in a conspicuous place, one or more of the "Hog Cholera" cards for each farm you quarantine. The "Notice" cards should be distributed among the neighbors whose hogs have not been infected as yet, and who may wish to avail themselves of the protection which section 11 of the new law gives them.

I hope your people will realize fully that hog cholera is contagious like smallpox or diphtheria and conveyed from farm to farm just like noxious weeds by the seeds. This disease never appears without infection, that is, the conveying of germs which cause it.

Money spent for drugs, patent medicines or medical treatment of any kind to be given internally is wasted.

The fact that there has been no sickness during the past few weeks, among the hogs on a farm where there has recently been hog cholera, is no assurance of safety. The farm may still be infectious and should be regarded as such by health officers and neighbors. Do not be deceived by a short lull

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in the disease. It may be necessary for you to watch this thing closely for several months.

May I ask you to assist us further, in this work of controlling hog cholera in Minnesota, by rigidly enforcing the regulations sent you some time ago, entitled "Rules for the Control of Hog Cholera in Minnesota."

Respectfully,

M. H. REYNOLDS.

Dr. Bracken has made a number of trips to various parts of the state, meeting by appointment a large number of supervisors, and he will doubtless continue this as opportunities may appear. Dr. Brimhall has made a number of trips out in infected districts, enforcing quarantine and instructing health officers; and I have talked hog cholera along the northern boundary of the hog cholera district, with the state farmers' institute under Superintendent Gregg. This I think will give an intelligent idea of the educational work we have been trying to do in the veterinary division.

Quarantine has been ordered and letters issued concerning such quarantine for several hundred farms in the infected counties, many of them inside of District A. It was not supposed that the result of this farm quarantine would be satisfactory in every instance, but I do believe that it has greatly lessened the spread, has had considerable educational effect, and will in the end assist us in controlling the disease.

Quarantine methods have, as a rule, been very successful with outbreaks which appeared at a distance from any generally infected area, but in cases where a number of adjoining farms were infected before the disease was reported, and in cases where outbreaks have appeared near the generally infected area, quarantine has been only partially successful.

Our results have been rather unsatisfactory in districts that were generally infected during 1896, for instance in Le Sueur, Nobles, Freeborn, Blue Earth and Mower counties. The infected area of the state increased rapidly during the latter part of August, during September, and up to this date. This rapid spread will probably continue through October and perhaps until the middle of November. We may hope that after that time there will be much less spread and that the disease in districts now infected will gradually disappear during the winter; but we must realize that these same districts will probably be invaded by the disease again next year, unless we are able to control it more successfully than in 1897.

I have seen frequent notices and comments in the papers during the summer and fall concerning various remedies for hog cholera.

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We have found it difficult to accomplish good results in neighborhoods where farmers have faith in hog cholera remedies, and for this reason the following letter was sent out to the newspapers in the southern part of the state, suggesting that they urge their farmer readers to spend no money for remedies, and to think more of quarantine and disinfection.

To the Editor,

Dear Sir: Allow me to suggest that you advise your farmer readers to spend no money for drugs or patent medicines of any kind or to invest their money in any particular form of feeding as a remedy for hog cholera, and that instead of wasting their money in this manner they should learn something of the real character of the disease, how it spreads from place to place and what can be done to prevent the spread. From the very nature of the disease it is practically impossible for drugs or patent medicines to be of any avail as cures. Money spent on them is worse than wasted, for it greatly hinders the local and state board of health work. When farmers begin to feel that they can cure the disease, or have it cured in case it appears among their herds, they get very careless, and this carelessness results in a greatly increased spread of the disease.

You may make any statements you please in accordance with these suggestions, as coming from me.

Very respectfully,
M. H. REYNOLDS.

SERUM EXPERIMENTS.

I take pleasure in reporting that the state experiment station and the state board of health are conducting a series of experiments in this state in conjunction with the Nebraska experiment station with a view to securing a blood serum which will render hogs proof against cholera, and which may possibly have some curative value. Dr. Peters of Nebraska is conducting the laboratory work and I am planning and conducting the field experiments. In general the method is as follows:

A horse is inoculated with pure culture of hog cholera bacilli, given in progressively larger doses, and the serum tested from time to time to ascertain its potency in giving immunity. The first dose is 5 c. c., and each dose is increased 5 c. c. until the horse receives as much as 200 c. c. at one dose. At first the horse becomes feverish and shows constitutional disturbance, but gradually acquires an immunity, and will finally receive a very large dose without any reaction. When the desired standard is reached the horse is bled and the serum used for inoculations. One c. c. of three days old culture of the hog cholera bacilli (Salmon) is added to each 10 c. c. of the serum before inoculation.

The experiment is divided into two sections:

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SECTION 1.—EXPERIMENTS AS TO PROTECTION.

(a) *Original Prevention*, that is, of swine that have not been exposed.—We select a small herd of well animals, that so far as known have never been exposed to the disease, and inoculate one-half of them. After ten days they are sent out in pairs, one inoculated pig and another that has not been inoculated, for control, each pair to be placed in a herd where the disease is present in a virulent form.

(b) *Exposed and Possibly Infected Swine.*—We select a herd in which undoubted hog cholera has appeared, and in which the entire herd has been exposed to infection. We then inoculate one-half of the herd, using separate ear marks for those that were sick and those that were well when inoculated, and have half the sick and half the well in each group.

SECTION 2.—EXPERIMENTS AS TO CURATIVE VALUE.

Carefully kept records of hogs that were sick when inoculated, when compared with records of sick hogs that were not inoculated, should give a basis for a fair estimate of the therapeutic value of the serum. Odd numbers mean inoculated, even numbers not inoculated. The tags are placed in the right ear for "well" and left ear for "sick when inoculated."

For our original prevention experiments the station has purchased ten shoats, five of which were inoculated on September 11th. After ten days they were ready to send out. One pair has been sent to each of the following places: Willmar, Bird Island, Sauk Center, New Ulm and Owatonna. It is too early as yet to give any estimate of results.

In our experiments with exposed and possibly infected swine Dr. Brimhall has inoculated as follows:

Twelve hogs inoculated, twelve kept as controls in the herd of Mr. Geo. Bartlett in Rapidan township, Blue Earth county.

Fifteen hogs inoculated, fifteen kept for controls in the herd on the poor farm in Granby township, Nicollet county.

Two hogs inoculated, two kept for controls in the herd belonging to Mr. J. Currie, same township.

Two hogs inoculated, two kept for controls in the herd belonging to Mr. K. A. Currie, same township.

Two hogs inoculated, two kept for controls in the herd of Mr. Frank Currie, same township.

Twelve hogs inoculated, twelve kept for controls in the herd of David Currie, same township.

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Fourteen hogs inoculated, fourteen kept for controls in the herd of Phil Haley, near Willmar.

Six hogs inoculated, six kept for controls in the herd belonging to Mr. Howard Libbey, Featherstone township, Goodhue county.

Fourteen hogs inoculated, fourteen kept for controls in the herd of Phil. Haley, near Willmar.

Sixty-seven hogs inoculated and sixty-seven kept for controls are already in this portion of the experiment. I hope to continue the work through the fall.

Several plans for dealing with hog cholera on a large scale, and in a general way, are under consideration; one of them is to establish a sort of dead line across the state just above the northern hog cholera boundary by means of two or three representatives of this board, who would travel across this district and talk to the farmers, and especially to the supervisors in every township.

Another plan under consideration is to employ several men in the same way, but send them here and there to new outbreaks as they appear, and have them remain in that neighborhood instructing the farmers and supervisors concerning the disease, methods of quarantine, etc., as long as needed. Both of these plans are somewhat expensive, perhaps beyond our present means; but it is quite evident that the plans employed this year have not been entirely satisfactory, and we must be thinking already of our next year's work.

GLANDERS.

The hog cholera problem is a large one and very serious, but it is only one of several. Hog cholera is probably the most serious disease that this department has to deal with, but glanders is far more prevalent than most people estimate, and it is serious, partly because it is difficult and often expensive to get hold of the cases, but much more serious because the disease is so fatal to human beings who may easily become inoculated.

We have tested 199 horses with mallein. We have traced up and killed eighty-two horses in various parts of the state. There have been fewer reports of glanders during the last two months than earlier in the season, and I feel that we are reducing the prevalence of this disease in the state.

M. H. REYNOLDS, M. D., V. M.,
Director.

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Dec. 31, 1897.

The work during the past year has been chiefly connected with glanders and hog cholera. There have been scattered outbreaks of other infectious diseases, viz., bovine tuberculosis, black leg and rabies.

HOG CHOLERA.

I believe the most lasting and important benefit that will result from the campaign of 1897 against hog cholera will be its educational bearing; that in getting hog owners and local health officers interested in the subject, we were preparing the way for a more successful campaign against this disease in the future. We have endeavored to control hog cholera just as the sanitarian in the field of human medicine controls the spread of smallpox, yellow fever, etc.

A careful study of the work that has been carried on during the past season is somewhat disappointing. I see now, as I look to the beginning of the work of 1897, that I had hoped for far more than was possible.

In order to study our results fairly, we must divide the state into two districts: (a) The previously badly infected district; (b) that portion of the state where the disease appeared for the first time during 1897. With the first our results have been quite unsatisfactory. With the second the results have been nearer what we were seeking after. In many cases the disease did not spread beyond the townships in which it first appeared. There are forty townships where the disease has been present since January 1st, but had entirely disappeared before November 1st. I have reports of nine townships in seven counties where hog cholera has appeared since November 1st. The total number of counties infected in 1896 was thirty-eight, in 1897 thirty-nine; the number of new counties infected in 1897, nine; the number of counties infected in 1896, but not in 1897, eight. In comparing the figures for 1896 and 1897, we must bear in mind the fact that we have accurate reports for 1897, and inaccurate reports for 1896. I have been disappointed with the results of our hog cholera serum experiments. Two hundred and sixty-six hogs, already exposed, and possibly infected, were used. These were upon twelve different farms in different parts of the state. Of 119 vaccinated hogs, 32 died; of 117 not vaccinated hogs, 27 died. I hope to continue this work under more favorable conditions during 1898. I wish to submit the following circulars concerning hog cholera for your approval:

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CIRCULAR OF INFORMATION

FOR QUARANTINING HOGS SUFFERING FROM ANY SUSPICIOUS DISEASE.

The purpose of the board of health in quarantining suspicious diseases of swine is to protect the financial interests of hog raisers. The proper quarantining of hogs imposes no hardship upon either the owner or the hogs themselves. Valuable time is often wasted before quarantine is established, and this may be followed by a serious spread of the disease, making its control much more difficult.

In all cases where hogs begin to sicken and die during the prevalence of hog cholera the disease should be reported to the local health officer or acting health officer. Quarantine should be established at once, for it is a simple matter to release quarantine, and should it be proven that the disease is not hog cholera or swine plague, no harm has been done by such quarantine.

All health officers and acting health officers are therefore instructed to see that all suspicious outbreaks of disease among hogs are properly quarantined.

The first step in quarantining a herd of hogs has been accomplished when the proper placard has been dated and signed by the proper officer and posted in a conspicuous place upon or near the yards, pens or sheds in which the hogs are confined. The health officer should then explain to the owner or keeper the nature and conditions of quarantine, and thereafter see that the conditions are rigidly enforced until quarantine is released.

Farmers should not only be permitted, but urged, to dispose of marketable hogs for slaughter as soon as suspected hog cholera appears in a neighborhood. Hogs from an infected neighborhood may be shipped for slaughter to any place where inspection is conducted by government, state or local health office, except as otherwise provided by the state board of health.

It is sometimes advisable at the beginning of an outbreak of hog cholera to kill and bury or burn the hogs as fast as they show the first suspicious symptoms of the disease.

If hogs are confined in small pens or yards after the disease has appeared, such pens or yards should be kept as clean as possible, by removing the manure frequently and keeping it in a compact pile, making alternate layers of manure and lime, for the manure is very infectious.

The troughs should be scalded once daily with boiling water, but little bedding allowed, and that should be frequently removed and burned. The floors of the pens may be disinfected by using a two per cent solution of crude carbolic acid in water. Lime should be sprinkled freely over the yard.

If swill barrel or tank is used, it should be emptied twice a week and scalded with boiling water, and then exposed to the sun until thoroughly dry.

If the pens or small yards can be kept thoroughly clean, as herein suggested, it is better to keep the hogs in such places than in the larger pastures and yards; otherwise it is better to give them a larger range.

The disease now prevailing in different portions of the state varies in symptoms in different localities and in different herds. It may be set down as a rule, however, that when any infectious (catching) disease appears among swine, it is probably hog cholera, modified more or less in symptoms by certain well known complications.

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CIRCULAR OF INFORMATION

FOR SHIPMENT OF HOGS FROM AN INFECTED DISTRICT.

The local health officer must insist, whenever it is practical, that hogs which are removed from an infected farm before the quarantine card is posted, must be hauled in wagons, and loaded directly from them into the cars.

Racks and wagon boxes used for hauling such hogs must be tight, and so constructed at the bottom as to prevent the scattering of manure and litter along the highway.

Wagon boxes, or racks, which have been used for transporting such hogs must be thoroughly disinfected as soon as the work is finished. All parts of the wagon that have come in contact with the hogs or litter must be thoroughly saturated with the disinfecting fluid. Two per cent solution of crude carbolic acid in water is cheap and effective.

Neighbors on whose farms the disease has not yet appeared should never be allowed to help haul the hogs from the infected farm, as there is always great danger that the disease will be spread from farm to farm by such action.

In response to suggestion at the last meeting we have issued the following circular on "So-Called Hog Cholera Cures."

This circular has been sent to nearly all the papers in the infected portion of the state, and sent out quite freely to chairmen of town boards and other local health officers. This has brought us into some conflict with hog cholera cure firms:

CONCERNING SO-CALLED HOG CHOLERA CURES.

At a meeting of the state board of health, Oct. 12, 1897, it was decided that the veterinary department should issue a circular of advice to farmers and stockmen concerning the many so-called cures for hog cholera, and the men who are going over the state selling them. These men are teaching that the disease is not contagious, and that it can be cured by their special preparation, that all other medicines are useless, etc. Some are even teaching the silly doctrine that hog cholera and swine plague are caused by certain methods or systems of feeding.

Hog cholera has been proven infectious by many different men and by many careful experiments. Practical experience supports these scientific experiments, and so it is difficult to understand how anyone who has had experience with the disease can think otherwise than that it is infectious.

These hog cholera cure agents are themselves a constant source of danger, as they go from farm to farm. Owners and local health officers should not allow them to go near the hogs upon any farm where the disease has not appeared, and they violate the law when they go into pens or yards where hogs have been quarantined by local or state board of health.

From the very nature of the disease it seems impossible for drugs or patent medicines of any kind to have any curative value, and money paid for

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drugs or chemicals to be used as cures is therefore wasted. Such drugs as crude carbolic acid, corrosive sublimate, creolin, lime, etc., have value as disinfectants only.

It is unfortunate that farmers should believe in these so-called cures, for, as a consequence, they usually grow very careless about matters of quarantine and protection from infection.

Editors will do a good thing for their farmer readers if they repeatedly urge them to spend no money for any hog cholera cures.

Mr. John Cownie, vice president of the state agricultural society of Iowa, has recently superintended a test of the most prominent of these hog cholera cures, and his conclusions, as published at length in *Wallace's Farmer and Dairyman*, of October 15th, are as follows: "So far, the disease which is now destroying the swine herds of our state has baffled all efforts to cure or even control it, and each and every one of the so-called 'hog cholera cures' now on the market have proved, when put to a fair and honest test in a herd really affected by the disease, to be without merit, and absolutely worthless as a cure for this dread complaint."

Henry Wallace, well known all over the West as one of the most prominent agricultural editors, followed this experiment closely from beginning to end, and certifies to the correctness of Mr. Cownie's statement.

The only prospect now in sight for the cure or medical prevention of this disease seems to lie in the way of blood serum or antitoxine. We hope it will not be many years before some vaccine will be discovered which will be as sure a preventive of hog cholera as vaccination is for smallpox, or as good a treatment as antitoxine for diphtheria; but these things are all in the experimental stage as yet, and it may be a long time before any can positively be recommended. Meanwhile the farmers of Minnesota should not add to their losses by spending money for worthless hog cholera medicines. They should, however, do everything in their power to prevent the spread of the disease by excluding the common carriers of infection from their herds of hogs.

M. H. REYNOLDS, M. D., V. M.,
Director of the Veterinary Department of the State Board of Health.

Newspapers.—I think that this board should recognize, in some public way, the generous assistance that has been given us by the newspapers of the state. They have printed very freely the large amount of matter which has been sent them concerning hog cholera during the season, and in this way have benefited their farmer readers, and greatly assisted us in the work.

It will evidently be necessary to alter the rules for the control of hog cholera in Minnesota as adopted by this board on Aug. 10, 1897. Certain ones must be abolished, new ones added, and others modified. I would suggest that this question be referred to the committee on infectious diseases of animals and the executive committee jointly with power to act.

I wish to continue my investigations with the hog cholera antitoxine serum.

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GLANDERS-FARCY.

I am pleased to report that the work with glanders-farcy during 1897 has been very satisfactory. Three hundred and ninety-one horses have been tested with mallein, and 180 of these have been killed or have died of glanders-farcy under observation.

There has been a peculiar distribution of the reported outbreaks during the past year. The disease has been prevalent in the extreme northwestern portion of the state. Seven horses have been destroyed in Marshall and thirty-four in Polk county. There is a strip of territory, covering several townships in width, beginning near Willmar, in Kandiyohi county, running southwesterly through the eastern part of Chippewa into Yellow Medicine county, in which glanders-farcy has been very prevalent. In this district there have been eight cases in Kandiyohi county, twenty-two in Chippewa, three in the eastern portion of Lac qui Parle and five in Yellow Medicine. Another quite serious outbreak occurred in Redwood county, involving a loss of six horses. In Faribault county there were seven horses, in Winona county eight, in the northwestern corner of McLeod county eleven, in Carver county thirty, in Hennepin county nine, in Wilkin county thirteen known cases, with others which are probably affected with glanders-farcy, under quarantine, and seven horses yet to be tested with mallein.

In addition to these there have been less serious outbreaks in Cass, Todd, Crow Wing, Isanti, Stearns, Stevens, Cottonwood, Murray, Waseca, Mower, Olmsted, Lyon, Lac qui Parle and Big Stone counties.

Explanation of Distribution.—Explanation of this serious prevalence of glanders-farcy in the extreme western portion of the state probably lies in the fact that herds of western horses are frequently driven across the state line and sold, and these herds probably bring the disease with them.

A prevalence of glanders-farcy in certain of the interior counties can probably be explained by the statement that the disease has previously existed in certain neighborhoods, and the people, being unable to recognize it except in advanced form, have traded and moved these infected horses about, spreading the disease wherever they have gone.

I believe that the work done looking to the control of these interior outbreaks has been very thorough.

I believe that this state board of health should coöperate with the National Bureau of Animal Industry and the proper state

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officials of North and South Dakota, and perhaps Montana, to protect the western and northwestern counties, and that this should be done in the near future.

What Horses to Test and When to Kill.—The question has arisen several times during the past year whether it was wise to insist on testing all horses that had been exposed in the stable with undoubted glanders-farcy, and to condemn for slaughter all horses which gave mallein reaction, but showed no other symptoms of the disease.

Our work during the past year has brought to light the startling fact that there are many cases of glanders-farcy which show no external symptoms of the disease, so far as the most expert veterinarian can observe. Work done by Nocard and other veterinarians in Europe. and by Dr. Williams and others in this country, indicates that there are occasional recoveries of mild cases under favorable conditions, and it is this fact that has caused us to do considerable hard thinking on the problems just stated. Under some circumstances it is undoubtedly practical to order partial quarantine for a long period of time, during which one or more mallein tests may be given with a view to estimating the progress of the disease. Horses that do not react after the second or third test may, as shown by Nocard, be considered as having recovered from the disease. We have no means of estimating at time of test whether an animal may recover, neither can we know in any given case that an animal which is not discharging from the nose or from farcy sores is not infectious. The startling fact that there are many horses affected with glanders-farcy that show no external symptoms is a most complicating factor in dealing with this disease. The plan which we have had in operation during the past year is outlined quite fully in the attached copy of stock letter, which is sent to chairmen, and in the accompanying circular concerning glanders-farcy, soon to be issued:

CIRCULAR OF INFORMATION

CONCERNING GLANDERS-FARCY.

In all ordinary cases of suspected glanders-farcy, first quarantine the suspected animals, then call in a competent veterinarian who shall make such examinations and tests as he may deem necessary. Further action of the board should be largely determined by the diagnosis and advice of the veterinarian.

All horses that have a discharge from the nose, or that have had recent sores upon the body, and all horses that have been worked as mates with such horses must be included in this preliminary quarantine.

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The mallein test should be conducted as nearly as possible according to the plan given in the blanks, which are sent from this office with the mallein.

All horses that give a clear reaction to the mallein test and show external symptoms of the disease; all horses that react to the mallein test and have chronic cough or any chronic lung trouble, thick wind, etc.; and all horses which show positive symptoms of the disease without a clear mallein test must be destroyed without delay. All horses which react, but show no other symptoms of the disease, may either be killed at once or quarantined to be retested at the end of thirty days, or continued under partial quarantine for retest for a period not to exceed one year from the first test.

Horses that have reacted twice within an interval of thirty days or more, whether showing other symptoms of the disease or not, must either be killed at once or continued under partial quarantine for a period not longer than a year from first test. If at any time within the year these horses show external symptoms of the disease they must be killed. If they show no external symptoms of glanders-farcy, but react again at the end of the year to the mallein test, they must be continued under partial quarantine until they have been retested without reaction. They may then be released. During the time they are in quarantine they must not be sold. In case it is decided to retest at the end of thirty days, the same ruling must be applied as though the test had occurred at the end of the year.

In all cases where retests are made, the quantity of mallein used should be one-half larger than that used at the first test.

It is not always necessary to quarantine all the horses on a farm, but all cases that are discharging from the nose or from sores upon the body must be rigidly quarantined. The veterinarian can often select a team that will be reasonably safe to allow upon the road. Such team must not be put into other than the owner's stable, or tied to any public hitching post or rack, or be watered from any public watering trough or tank.

Horses affected with glanders-farcy, or any other infectious disease, are considered by law as having no commercial value.

The carcass of a glandered horse must be destroyed by burning, if practicable; otherwise, buried under four feet of earth.

A place must not be released from quarantine until the owner has disinfected the stable and contents, and has otherwise cleaned up as directed by the health officer.

Health officers must realize that the law imposes important duties upon them, and that there is a severe penalty for either neglect or refusal to perform their duties. They should impress the fact upon the owners of horses that the law also imposes duties and penalties upon them.

Glanders-farcy is a very fatal disease, and is easily conveyed to human beings.

TUBERCULOSIS.

This subject has been quite fully reported in my several quarterly reports during the past year, and need not be enlarged upon at this time. I am still satisfied that, for the present, the most practical plan for dealing with tuberculosis is to encourage owners to have their cattle tested, and to insist that herds be tested with tubercu-

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lin where there is good reason to suppose that this disease is present. I believe that it is not practical at present to attempt any sweeping measures for the eradication of this disease.

Conferences with the Health Officers of St. Paul and Minneapolis.—As reported at a previous meeting of this board, the committee on infectious diseases of animals had two meetings with the health departments of the two cities, at which meetings certain important matters were agreed upon. First, that a public abattoir for each city must be secured before the meat supplies of the two cities can be properly inspected. We also agreed concerning the tuberculin test; that cattle which react upon tuberculin test ought to be permanently branded, that the brand ought to be uniform, and that the most practical plan is to brand with a hot iron upon a conspicuous place, as upon the left hip. The state board of health is willing to furnish branding irons for such use.

It was also agreed, I believe, that the federal government regulations concerning the inspection of tuberculous cattle that are to be slaughtered should also be carried out under state inspection in dealing with home markets. The health department of each city has agreed to send me duplicates of their tuberculin and mallein records for proper filing with this department.

CORN STALK DISEASE.

Corn stalk disease is the very unscientific but expressive name for a disease that has prevailed in many portions of the state during the past fall. This disease has been reported in the following counties: Benton, Nicollet, Brown, Blue Earth, Sherburne, Houston, Jackson, Chisago, Wright, Freeborn, Martin, Redwood,—in all, twelve counties.

The disease is probably not a new one, but has only been recognized and described within a few years. There is no evidence that it is infectious, and consequently it does not come within the jurisdiction of the state board of health, yet it is invariably reported as an infectious disease, and has caused a great deal of alarm. The etiology of this disease has not as yet been demonstrated, and we know little concerning it, except that it usually appears among cattle that have been turned out in the corn stalk fields, and that it rarely appears among cattle that are fed shocked corn fodder.

MISCELLANEOUS DISEASES.

Black Leg.—During the year there have been occasional outbreaks of black leg among young cattle in western portions of the state.

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Anthrax.—Anthrax has been reported, but the evidence of its existence has not been conclusive.

Sheep Scab.—Scab in sheep does not prevail to a serious extent in this state, but there is imminent danger that we may have much trouble in the future, because of the large shipments of sheep every fall from other states where the disease is prevalent. This disease can only be controlled by the coöperation of interested states, with the assistance of the railroads and the general government. Dr. Salmon made certain important recommendations concerning this disease in the twelfth and thirteenth annual reports of the bureau of animal industry.

Rabies.—There have been a number of cases of canine rabies in the state, mainly in the vicinity of St. Paul, and one outbreak of bovine rabies which resulted in the loss of four head of cattle. This occurred in Wright county. I presume Dr. Wesbrook will report this quite fully.

Verminous Bronchitis.—One serious outbreak of so-called verminous bronchitis at Taopi, in Mower county, has been investigated. This outbreak appeared in the fall among spring calves. Ten had died at time of the first report. Others died later, and the loss in thrift and growth was quite serious in still others. Verminous bronchitis is certainly an unsatisfactory name for this disease, for it is not distinctly a bronchitis, and the disease appears under conditions that give a strong suspicion that the strongylus is not the primary cause of the disease.

IN RELATION TO EXPERIMENT STATION AND FARMERS' INSTITUTES.

I have been greatly pleased with the way in which the veterinary work of the state board of health has harmonized with the veterinary division of the University of Minnesota experiment station. As experiment station veterinarian, I am deeply interested in the investigation of infectious diseases of domestic animals, and as director of the veterinary department of the state board of health my work has a practical bearing upon this same group of diseases. These two departments, if properly managed, can be cared for in this way to great advantage.

The relation that has existed between the state farmers' institute and the state board of health work has also been very harmonious and helpful.

Field Veterinarian.—Concerning the work of Dr. S. D. Brimhall as field veterinarian to the state board of health, I wish to state that it has been very satisfactory, both to the farmers and stockmen with

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whom he has had to deal, and to me as director of the veterinary department, and I trust to Dr. Bracken as executive officer of the board. Although his work necessarily brings him at times into something of a conflict with owners, I am pleased to report that in every case, except one, he has been able to obtain their full confidence. He seems to have a happy way of dealing with people in this kind of work. I believe that in attending to cases over which there is dispute by different veterinarians or health officers, and by going to places where there are no competent veterinarians, he is doing good work for the state.

M. H. REYNOLDS, M. D., V. M.,
Director.

March 31, 1898.

HOG CHOLERA.

During the quarter ending April 1, 1898, there have been reported comparatively few outbreaks of hog cholera. Those reported were distributed in the following counties: Two townships in Fillmore, two in Winona, one in Olmsted, three in Dodge, one in Steele, one in Goodhue, two in Dakota, two in Brown, two in Redwood, five in Renville, one in McLeod, one in Ramsey, one in Washington, one in Wright and one in Big Stone, making twenty-six district outbreaks. As was expected, the hog cholera has been very quiet during the winter months. I do not anticipate serious trouble from this disease before June or July, after which I think it quite reasonable to expect that the situation will gradually grow worse, until we have another such experience as during 1896 and 1897.

Hog Cholera and Human Health.—It is held as a general principle among sanitarians that meat from any animal which is distinctly sick should not be used for human food, and this should certainly apply to hog cholera. The question is frequently asked, "What if meat from sick hogs does go on the market; there is no evidence whatever that it is injurious to human health." There is good evidence that such meat is injurious to human health, and in every case where the animal is distinctly sick, the meat should be condemned.

Van Ermengem has collected histories of a large number of outbreaks of meat poisoning, involving 112 different places and some 6,000 persons. In 193 of these outbreaks, the animals had been

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affected with pyaemia, septicaemia or enteritis. In one of these epidemics an inflammation of the bowels had prevailed among certain domestic animals, and seemed to be infectious. From one of these animals, Van Ermengem obtained a germ belonging to the hog cholera group, which produced a severe inflammation of the stomach and intestines of people who subjected themselves to the experiment of eating the infected meat. The flesh of one animal affected with this disease caused death both to human beings and dogs, that had eaten of it, and a number of deaths occurred after eating the flesh of a second animal of this same group, which had been made into mince meat.

An instance has recently occurred in this state that seems worth reporting, as illustrating this point. A family living near Greenland was taken seriously ill after eating meat from a hog killed from the same pen in which were other hogs suffering from hog cholera. It is reasonable to suppose that the hog that was slaughtered and used for food purposes was already infected, but that it had shown no positive symptoms of the disease, for an intelligent farmer would scarcely have used meat from a hog that he knew to be sick.

It was recently reported in the *Albert Lea Standard* that two families near Alden were seriously ill during the latter part of March from the effects of eating hog cholera pork. In one family the mother and one boy were dead at the time of this report, and others were not expected to recover.

Newspaper clippings give rather poor evidence on technical questions, but I think we should consider this phase of the matter in discussing plans for dealing with the hog cholera problem during 1898.

GLANDERS.

During the quarter ending April 1, 1898, there have been tested with mallein, under the supervision of this department, 121 horses. Sixty-four horses were killed, distributed in counties as follows: Three in Mower, three in Lyon, two in Renville, two in Carver, six in Hennepin, one in Swift, seven in Traverse, five in Wilkin, seven in Otter Tail, one in Polk, seven in Marshall, four in Hubbard, one in Morrison, one in Wabasha, three in Faribault, six in Rock and five in Murray.

I would call attention to the continued prevalence of this disease in the western border counties.

TUBERCULOSIS.

As reported at the last meeting, we have been coöperating with the Minneapolis department of health, the Minneapolis inspector

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having been given authority, as a representative of the state board, to quarantine cattle suspected of tuberculosis outside of the city limits, and to attend to the inspection of the carcasses of such animals condemned for slaughter.

M. H. REYNOLDS, M. D., V. M.
Director.

June 30, 1898.

HOG CHOLERA.

The present outlook is certainly encouraging. But seven outbreaks, in different townships, have been reported since April 1st, from the following counties: Dakota, Mower, Cottonwood, Carver, Benton, Nicollet and Wabasha. Twenty-six townships were reported during the preceding quarter, making a total of thirty-three townships in twenty-one counties infected during the first six months of 1898. During the corresponding period of 1897 the disease was reported from forty-one townships, in twenty-three counties. Of the twenty-one counties which have been reported since January 1st, all but three (Wabasha, Carver and Benton) were more or less generally infected in 1897, and it may well be questioned whether these counties were entirely free from the disease during that year.

Special Hog Cholera Field Work.—I take pleasure in reporting that this work is now under way. The members of the state board of health will remember that we made a start along this line last year, doing some experimental work in Renville and McLeod counties. At previous meetings of the board we have discussed various plans. Having no data upon which to base an estimate as to the probable expense and rapidity with which the work could be done, it was decided to employ one man for a few weeks early in the season, and use his experience as a basis for further action. Accordingly, Dr. J. G. Annand of Minneapolis was employed, to begin work on May 23d. It soon became apparent that the expense would be less than we had expected. Dr. Annand visited thirty-two townships in five weeks, averaging, in spite of unfavorable weather and bad roads, one township per diem. As salary he is paid $100 per month and expenses. The expenses have averaged $11.41 a week

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for the first three weeks. As his work extends farther west, railroad fares will increase this rate somewhat; but, on the other hand, as the season advances, his livery bills will be lighter. It is probable that his total expenses will average less than sixty dollars a month, probably not over fifty dollars.

Between May 23d and June 24th Dr. Annand was working in Wright and Kandiyohi counties, covering a strip of territory between two and four townships in width, extending from the extreme eastern portion of Wright to the extreme western portion of Kandiyohi county. By the 1st of August, when we may reasonably expect that the hog cholera season will be upon us again, Dr. Annand will probably have covered Chippewa, Lac qui Parle, Swift, and a large portion of Stearns counties.

Last season I reported a very troublesome outbreak in the northwestern portion of Stearns county. Subsequently one township in the southern portion of the county became infected. So far no outbreaks have been reported for 1898, but I deem it of the utmost importance that we use every effort to control the disease in this county this year, because the outbreaks reported last season were at some distance from any other outbreaks so far as known, and the infected territory was comparatively limited. For this reason I have planned that Dr. Annand shall spend considerable time in Stearns county, instructing and assisting township supervisors and farmers.

Perhaps I should explain the kind of work that Dr. Annand is doing. We have blocked out a territory, varying from two to four townships in width, just north of last year's infected district. Dr. Annand travels by bicycle, going from township to township, making the acquaintance of members of the town boards, and urging upon them the fact, which they must realize in order to do their duty properly, that hog cholera is an infectious disease. He furnishes each chairman with a complete hog cholera file, containing blanks, circulars of information, placards, etc., explains their uses, and gives as much information as possible concerning the disease itself. I am pleased to learn that Dr. Annand has been kindly received by members of the town boards, and that these gentlemen appear anxious to secure information relating to their duties.

This is probably much more effective as a means of imparting knowledge than the distribution of printed matter, although of course it will be necessary to rely largely upon the latter method, because our appropriation is entirely too small to permit our sending Dr. Annand or others to all parts of the state. This work, if faithfully and persistently carried out, must result in great good to

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the stock interests of our state, and we must bear in mind that this is the chief purpose for which our fund was created, and the veterinary work undertaken, although, of course, the relation between the human and the animal diseases is not overlooked.

I have been doing somewhat similar work to that of Dr. Annand by attending state farmers' institutes, as a member of the corps, and speaking on hog cholera, twice daily, to large audiences of farmers in Cottonwood, Jackson, Rock, Nobles, Lincoln, Lyon, Yellow Medicine, Lac qui Parle, Wright, Stearns, Kandiyohi, Meeker, Swift and Stevens counties. Mr. Gregg, superintendent of the state farmers' institute, has furnished transportation and paid all expenses of my work in this connection, thus giving material assistance to this board. I was in this work from May 24th to June 24th. This institute work was really planned on account of the general prevalence of hog cholera. Mr. Gregg invited me to select the counties in which the institutes would be held, and I suggested those in which there were but few or no outbreaks during 1897, but which bordered upon infected counties. The result of this work has been very satisfactory.

I am collecting as much information as possible concerning the conditions under which hog cholera appears and the relation of food and care to the disease.

I am thoroughly convinced that the bacillus of hog cholera is not the only feature to be considered, by any means, but that the kind, amount and quality of the food, methods of feeding and conditions of care have much to do with the development and spread of the disease.

You will remember that last year Dr. Salmon, chief of the Bureau of Animal Industry, carried on some investigations with a new hog cholera antitoxine serum with apparently good results in Page county, Iowa.

I have been in correspondence with Dr. Salmon, and trust that, in the course of two or three months, we may have some of this serum for use in Minnesota.

The work with Dr. Peter's serum will probably be continued during 1898. The doctor writes me that the results in his own work were very satisfactory last year, and that he hopes to overcome the difficulty that may account for our unsatisfactory results in Minnesota. I will be able to do this work both as an officer of the state board of health and of the University of Minnesota agricultural experiment station. I believe that the two institutions can coöperate in this way with marked advantage, especially in the way of economy.

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Since our last meeting we have prepared the following circular of instructions, which will probably save us considerable correspondence and be of assistance to local health officers. (Compare with former circular on p. 231.)

FOR QUARANTINING HOGS SUFFERING FROM ANY INFECTIOUS DISEASE.

The proper quarantine of hogs imposes no hardship upon either the owner or the hogs themselves. The chief purpose of the board of health in quarantining any suspicious disease among hogs is to protect the financial interests of the hog raisers. Valuable time is often lost before quarantine is established. This permits serious spread of the disease to take place, and makes its control much more difficult.

The disease now prevailing in different portions of the state varies in symptoms in different localities and in different herds. It may be set down as a rule, however, when any infectious (catching) disease appears among swine that it is hog cholera, modified more or less in symptoms by well known complications.

When hogs begin to sicken and die during the prevalence of hog cholera the disease should be reported to the local health officer or chairman of the town board, and quarantine should be established at once. It is a simple matter to release quarantine, but it should be proven that the disease is not hog cholera before quarantine is released. No harm has been done by such quarantine.

All health officers and acting health officers are therefore instructed to see that suspicious outbreaks of disease among hogs are properly quarantined.

The health officer should explain to the owner or keeper the nature and conditions of quarantine, and see that the conditions are rigidly enforced until quarantine is released.

Hog cholera is often spread by water in small streams and lakes, and for this reason hogs must not be buried near any lake or water course.

Poultry should not be allowed access to yards or pens where hogs are kept during the hog cholera season, and pigeons and crows should be shot or otherwise frightened away because of the danger of their spreading the disease.

The health officer or inspector should always wear overalls and overshoes or rubbers when going among diseased hogs. These overalls and overshoes or rubbers should always be kept a safe distance from healthy hogs, and from other agents which might convey the disease.

Quarantine cards must not be removed until six months after the last hog has died or recovered, and the premises disinfected in a satisfactory way, to the local board of health.

Farmers should be urged to dispose of marketable hogs for slaughter as soon as suspected hog cholera appears in a neighborhood.

Racks and wagon boxes used for hauling such hogs must be tight, and so constructed at the bottom as to prevent the scattering of manure and litter along the highway.

Racks and wagon boxes which have been used for transporting such hogs must be thoroughly disinfected as soon as the work is finished. All parts

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of the wagon that have come in contact with the hogs or litter must be thoroughly disinfected. Five per cent solution of crude carbolic acid in water is cheap and effective.

Neighbors on whose farms the disease has not yet appeared should never be allowed to help haul the hogs from infected farms, as there is great danger that the disease will be spread from farm to farm by such action.

The question will come up again this season as to the desirability of forbidding or permitting exhibitions of swine at county fairs in certain portions of the state. I would respectfully suggest that this has been already referred to our executive committee, and I hope that it may be ready to report at our next meeting.

GLANDERS.

I feel that we are making satisfactory progress in dealing with glanders. Town boards are doing their part of the work more promptly, and our results are more and more satisfactory as time passes. Minnesota veterinarians seem to be coöperating with the veterinary department of the state board of health. I think we are rapidly reducing the prevalence of this disease. During the past quarter there have been tested sixty-nine horses, of which twenty-five reacted. Those that reacted have been dealt with according to the rules which were adopted for this work at a previous meeting.

During the second quarter of 1897 forty-seven horses were tested, of which twenty-nine reacted. The larger figures for 1898 must not be taken as meaning that glanders is on the increase, but rather as an indication that township supervisors are doing more and better work.

During the past quarter five horses were tested with mallein in Polk county, with one reaction; eleven in Traverse county, with ten reactions; fourteen in Chippewa county, with one reaction; nineteen in Hennepin county, with nine reactions; one in Ramsey county, with one reaction; four in Rice county, with one reaction; seventeen in Otter Tail county, with ten reactions, and seven in Marshall county, with six reactions, making a total of seventy-eight tests with thirty-nine reactions.

I would call your attention again to the marked prevalence of this disease in the western counties.

The following rules, etc., regarding glanders-farcy have been issued since our last meeting: (Compare with former circular, page 235.)

RULES.

In all ordinary cases of suspected glanders-farcy, first quarantine the suspected animals, then call a competent veterinarian who shall make such

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examination and tests as he may deem necessary; the further action of the board shall be largely determined by the diagnosis and advice of the veterinarian.

All horses that are discharging from the nose, or that have had recent sores upon the body, and all horses that have worked as mates with such horses must be included in this preliminary quarantine.

Test with mallein all horses that have been exposed in the stable to cases that may be reasonably suspected of having glanders-farcy.

The following must be destroyed without delay: All horses that have given one clear reaction on mallein test, and shown any external symptoms of the disease, or any chronic lung trouble, such as chronic cough or thick wind; all horses which show positive symptoms of the disease without a clear mallein reaction.

Horses which have reacted but show no other symptoms of the disease may either be killed at once or continued under quarantine for retest, for a period of not less than thirty days or more than one year from date of first test. These horses must be retested at the end of the quarantine period and shall not be released from quarantine unless they fail to react on retest. If at any time within the year these horses show external symptoms of the disease they must be killed.

Quarantine may not be released in any case until the owner has disinfected the premises as directed by health officers.

In all cases where retests are made the second dose must be one-half larger than the first.

Carcasses must be destroyed by burning if practical, otherwise buried under four feet of earth.

Violation of Quarantine Defined.—It shall be deemed a violation of quarantine for any person to knowingly remove, authorize or cause to be removed any horse or mule quarantined on account of glanders-farcy from the premises whereon it is quarantined.

It shall be deemed a violation of quarantine for any person to knowingly cause, authorize, or permit to be placed, any horse or mule, except those legally quarantined, in any stable or inclosure that is under quarantine on account of glanders-farcy.

Suggestions.—The mallein test should be conducted as nearly as possible according to the plan given in the blanks sent out from this office. This plan for the test has been found very convenient, and it is important for the proper keeping for office records that the injection be made and the temperatures taken at uniform periods.

It is most economical, and usually most satisfactory, to have the veterinarian who makes the examination and conducts the mallein test finish the work at one trip.

Domestic animals affected with any infectious disease are considered by law as having no commercial value.

Health officers should realize that the law imposes important duties upon them and severe penalty for neglect or refusal to perform these duties. They should impress the fact upon the owners that the law also imposes duties and penalties upon them.

Glanders-farcy is very fatal to human beings, and easily communicable to them by inoculation through cuts or scratches upon the hands or face, or if the matter gets into the nose or eyes.

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Comments.—I believe that our present method of dealing with glanders-farcy will prove very satisfactory, and that in a comparatively few years the prevalence of the disease in Minnesota will be greatly reduced. I do not anticipate that we can ever free the state entirely from glanders-farcy, but I do feel that we will be able to so nearly rid the state of this disease that it will soon become comparatively rare. During the past year and a half I have necessarily had a great deal of correspondence with veterinarians in other states who are doing this kind of work, and I am thoroughly satisfied that Minnesota's methods and results are fully equal to those in existence anywhere in the United States. This is not my opinion alone. I have had expressions of opinion from prominent men in this line of work in other states, and to the effect that the Minnesota state board of health is rapidly winning recognition for this work. The writer has been invited to present one paper, on the "State Control of Hog Cholera," at the coming meeting of the United States Veterinary Medical Association in Omaha, and another, on the "Station Veterinarian as a Member of the State Board of Health," for the National Association of Experiment Station Veterinarians, which meets in conjunction with the United States Veterinary Medical Association.

I do not mention these items because they refer particularly to my work, but because I take it for granted that the members of the state board of health will be interested in knowing how the work of the board is regarded in other states, and because I think you will be pleased to learn of the recognition our work is receiving.

BLACK LEG.

Four outbreaks of black leg have been reported indirectly by calls upon the state experiment station for vaccine. None of these have resulted in serious loss, so far as I have been able to learn.

ANTHRAX.

This is occasionally reported, but not demonstrated. In many of our anthrax reports the diagnosis may well be doubted.

SHEEP SCAB.

We have had two reports of sheep scab during the last quarter, both in Freeborn county, near Albert Lea. Dr. Brimhall went at once to verify the diagnosis, with instructions to give the farmers

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as much help as possible in their efforts to get rid of this disease. We have heard nothing further from the outbreak, and I take it for granted that further spread has been entirely averted.

I wish to submit the following copy for a circular. I think it important that we should issue something of this kind as soon as possible. I should also like to issue a small circular containing general information concerning sheep ticks, scab, etc., something similar to our hog cholera and swine plague circular. I have the copy for this circular prepared, and would suggest that, if further consideration of the matter is necessary, it be referred to the executive committee with power to act. Perhaps I should explain that the experiment station has cuts which could be used for illustrating this little circular, without extra cost to the state board. These cuts include the following: Sheep tick; three varieties of the sheep mites (psoroptes, symbictes and sarcoptes), together with a cut of a sheep-dipping vat, which any farmer who is at all handy with tools could make for himself.

SHEEP SCAB CIRCULAR.

The proper quarantine of sheep need not cause serious hardship either to the owner or the sheep themselves. It is a simple matter to release quarantine, and if it is subsequently proven that the disease is not sheep scab, no harm has been done. Valuable time is often lost before quarantine is established.

When sheep begin to show symptoms of any suspicious skin disease the fact should be reported at once to the local health officer or the chairman of the board of supervisors. (See section 2 of chapter 233, "An Act to Prevent the Spread of Contagious and Infectious Diseases Among Domestic Animals in this State.")

All local health officers and acting health officers are instructed to quarantine all suspicious forms of skin diseases among sheep.

Health officers should explain to owners or keepers the nature and condition of quarantine, and see that these conditions are rigidly enforced until quarantine is released.

Sheep scab is caused by minute parasites which may either burrow into the skin or may live upon the surface. The disease is spread only as the mites themselves are scattered about.

RULES.

1. Animals affected with sheep scab shall be considered as suffering from a communicable disease, and shall not be transported from point to point in Minnesota.

2. Animals supposed to be affected with sheep scab shall not be allowed to enter any stockyards or other public place where they may come in contact with healthy sheep, or where healthy sheep are liable to be quartered later.

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3. All sheep that show scab or any other inflamed condition of the skin, and all sheep that have associated in the same flock with such sheep, must be included in this preliminary quarantine.

4. Quarantine must be continued until the entire flock has been dipped two or more times according to instructions. After being dipped, sheep should not be returned to their former yards or sheds until after an interval of four weeks.

5. Quarantine must not be released in any case until the owner has disinfected the premises as directed by the proper local health officers.

6. In all ordinary cases of suspicious sheep scab, health officers should first quarantine the suspected animals, and call a competent veterinarian to make such examination as he may deem necessary. At the same time he must report the facts promptly to the state board.

Violation of Quarantine Defined.—It shall be deemed a violation of quarantine for any person knowingly to remove, authorize or cause to be removed, any sheep quarantined on account of an infectious or contagious disease from the premises whereon they are quarantined.

It shall be deemed a violation of quarantine for any person knowingly to cause, authorize or permit to be placed, any sheep, except those legally quarantined, in any stable or inclosure that is under quarantine on account of any infectious or contagious disease of sheep.

M. H. REYNOLDS, M. D., V. M.,
Director.

Sept. 30, 1898.

HOG CHOLERA.

The hog cholera situation has been more serious than during the preceding quarter, but we have no cause to feel disappointed with the general condition of this work. The situation is somewhat different from what it has been before, in that we have had scattered and isolated outbreaks in various places in the northern part of the state; for instance, in Kanabec, Mille Lacs, Benton and Wadena counties, with a serious outbreak in the southeastern corner of Stearns. So far these outbreaks have not spread widely, and with one exception, perhaps, have been quite easily handled. It is possible that we may have further trouble from them next season. During the past quarter hog cholera has been reported from thirty-five townships in fifteen counties. Perhaps I should state in this connection that the township supervisors in the counties that were generally infected last year, viz., Nicollet, Martin, Freeborn, etc., have probably not reported as fully as those in the more recently

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infected districts. In general I consider the present situation as decidedly better than at the corresponding period of 1897.

Dr. Annand's field work has been prosecuted vigorously during this quarter, and has probably accomplished a great deal toward restricting further spread. His regular township work has been continued westward, and he has now finished Wright, Meeker, Kandiyohi, Renville, Brown, Redwood, Stearns and Lyon counties. You will remember that Dr. Annand had been employed for the purpose of doing some field work in the way of instructing chairmen of town boards concerning the nature of the disease and the duties that would devolve upon them, as local health officers, in case the disease should invade their township. In addition to this work, he has made trips to special outbreaks during this quarter as follows:

On August 3d, to Amiret township, Lyon county, upon request of Supt. O. C. Gregg of the state farmers' institute. Mr. Gregg reported that a farmer was losing hogs from some disease resembling hog cholera. Accordingly, Dr. Annand was sent to Amiret, with instructions to stay as long as seemed necessary. On reaching this place he learned that the person whose herd he went to investigate had lost about 100 out of 140 hogs, and that the disease had first appeared about the 15th of July. This illustrates the difficulty we have had to contend with since the beginning of this work; namely, tardy reports. Many local health officers do not seem to consider an outbreak worth quarantining until it has spread widely. At Amiret Dr. Annand learned that the disease had appeared among a small lot of hogs in Tracy. This did not prove to be a serious matter, the gentleman owning but two or three hogs. Dr. Annand also learned of a serious outbreak a mile and a half south of Tracy, where 100 hogs had died. All three of these places were quarantined, and so far as I have been able to learn there has been no further spread of the disease from any one of them.

While Dr. Annand was at Amiret, I received information concerning a serious outbreak at New Avon, and adjoining townships in Redwood and Brown counties. As soon as he could be spared from Amiret he went to New Avon township. The chairmen of twelve neighboring townships were visited while working with this outbreak. On August 20th he went to Eden township, Brown county, and while there visited Home and Prairieville townships. While in this portion of the state he assisted local health officers with three outbreaks in Lyon county, three infected townships in Brown county, and one township in Redwood county, and visited the chairmen of twenty-four townships.

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On August 20th he went to Plainview township, Wabasha county, from which place a very serious condition of things had been reported. While there he visited three townships.

After his work in Wabasha county was finished he continued the regular field work until September 27th, when he went to the southeastern part of Stearns county where there seemed to be a serious outbreak of hog cholera that was not being properly dealt with. He has recently gone back to this place, and is there at this time.

As was expected, his expenses while working in the western part of the state have been greater than at the beginning of his work in Wright county, and have averaged during this last quarter $15.81 per week.

Since our last meeting the following circular has been issued to take the place of our old "Rules for Controlling Hog Cholera:" (Compare with rules on p. 216.)

HOG CHOLERA REGULATIONS.

All railroad shipping pens in the following counties are hereby declared to be probable or possible sources of infection for hog cholera: Fillmore, Mower, Freeborn, Faribault, Martin, Jackson, Nobles, Rock, Pipestone, Murray, Cottonwood, Watonwan, Blue Earth, Waseca, Steele, Dodge, Olmsted, Winona, Dakota, Scott, Sibley, Renville, Yellow Medicine, Lac qui Parle, Chippewa, Kandiyohi, McLeod, Carver, Anoka, Stearns, Pope, Swift, Rice, Le Sueur, Nicollet, Brown, Redwood, Lyon, Lincoln, Meeker, Wright, Washington, Wabasha, Houston and Goodhue.

1. Hogs must not be removed from any railroad shipping pen located within the aforesaid counties except for immediate shipment by rail to some point for slaughter.

2. Hogs shipped from point to point in Minnesota, or from another state into Minnesota, and not intended for immediate slaughter or for exhibition at the state fair, must be crated, shipped in other than stock cars, and accompanied by a certificate stating that they were free from disease when shipped and that there had been no hog cholera in the neighborhood from which they were shipped for a period of at least six months previous to the shipment. This certificate must be signed by a licensed physician, veterinarian or health officer, and must be delivered to the local health officer of the district into which the hogs are shipped.

3. Hogs for shipment in crates must not be permitted in or loaded from stockyards.

4. Hogs intended for exhibition at the state fair must be shipped in cars that have never carried hogs, or in stock cars that have been disinfected by the railroad, according to agreement with the state board of health. They must be shipped in crates, and must not be loaded from or through any railroad shipping pens. Upon arrival at the fair grounds, the person in charge will be required to show a clean bill of health, as designated above, before the hogs are unloaded.

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Managers of county and district fairs held in any of the counties named above are requested not to have swine exhibits in connection with such fairs during 1898.

By order of the state board of health.

H. M. BRACKEN, M. D.,
Secretary and Executive Officer.

In these regulations we have done away with Districts A and B, as arranged for quarantine purposes last year. All railroad shipping pens located in infected counties, and certain others that border infected counties, have been quarantined, so far as movement of swine from or through these yards into the country is concerned. No movement of swine from these yards is permitted, except for shipment by rail to some point for slaughter.

We are all anxiously waiting for a satisfactory hog cholera antitoxine that can be cheaply and easily produced. Dr. Salmon, chief of the Bureau of Animal Industry, has recently assured me that the new government serum seems quite promising. At present it is distributed only to representatives of the Bureau of Animal Industry, who are experimenting with it in different portions of the country. Dr. Salmon has promised some for experimental use this fall in Minnesota, and I hope to be able to make a report concerning it at our next meeting. When we are able to combine quarantine with preventive vaccination of adjoining herds, our work will be greatly simplified.

The results of our work at the state fair seem to have been satisfactory, both to the managers of the fair and to the exhibitors of swine. Some of the conditions imposed last year seemed, on actual trial, to be impractical, and we have endeavored to eliminate such this year. Arrangements were made with the general freight agents that swine for exhibition at the state fair should be shipped in other than stock cars, or in stock cars that had never carried hogs, or in stock cars that had been disinfected by steam. Ten days before the fair opened the general freight agents were furnished with a list of intending swine exhibitors, in order that they might be able to estimate the number of cars needed and the points from which shipments would be made. It was further arranged that each freight train passing through places from which shipments were to be made should have two such cars as are described above attached on days when exhibitors would probably be shipping hogs. Upon arrival at the fair grounds, each exhibitor was required to sign a certificate to the effect that his hogs were free from disease when shipped, and came from a neighborhood in which there had been no suspicious swine disease during the past six months. Dr. Brimhall

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inspected the hogs on their arrival at the fair grounds, and thereafter daily during the continuance of the fair. The pens were so constructed that visitors could not climb into them, and an extra partition was placed between the pens, so that litter could not get through from one pen to another. A small circular was issued to exhibitors, and sent through the general railroad offices to the local freight agents, notifying them of the conditions that had been imposed. It was further provided that, if upon inspection, any sick hogs were found upon the fair grounds, they were to be isolated in pens especially provided for this purpose. If in these cases the disease proved to be hog cholera, the sick hogs were to be promptly killed, and the carcasses destroyed. No suspicious swine disease appeared at the state fair, and I have recently written to exhibitors inquiring whether any disease had broken out among their hogs since their return home. So far I have not learned of any such unfortunate results. There are some difficulties in this work that have yet to be overcome, in dealing with future exhibits. Some exhibitors start out early in the season visiting county or other state fairs, and are away from home several weeks before our fair opens. They usually have the same car with them during the entire trip. If they start in Wisconsin, where no such conditions as those stated above are imposed, they bring a car to our state fair that does not answer to our requirements. In order to avoid this difficulty in the future it will be necessary to issue our circular of information to such exhibitors much earlier in the season than we did this year.

GLANDERS.

During the past quarter we have tested sixty-five horses with mallein, and of these sixteen have been killed. The disease seems to be less prevalent in the western counties of the state than it was in the past.

Our present method of dealing with horses that react to the mallein test but show no external symptoms of the disease has so far proven satisfactory. It is probable that, by quarantining such cases according to the rules of the state board of health, we will be able to save quite a number of horses that would otherwise be destroyed. Practicing veterinarians have been assisting us loyally in our effort to stamp out glanders, even though by so doing they have injured their own business.

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SHEEP SCAB.

I am pleased to report that sheep scab, which appeared at Albert Lea, and was reported at our last meeting, seems to have disappared.

BLACK LEG.

No cases have been reported during this quarter.

MISCELLANEOUS.

Dr. Brimhall has been attending to his regular field work during the past quarter, and I think we have reason to be well pleased with the results. Among his more important trips have been the following:

July 7th and 8th he went to North Branch, for the purpose of investigating a strange disease among cattle. He found that five cattle had died and that two were still sick, in a herd of fourteen head. The history and conditions of this outbreak pointed to the food as the probable cause of the trouble.

July 27th he went to Eden Prairie township, for the purpose of testing with tuberculin a herd of fifty-six cattle. Of these eighteen reacted and were quarantined. Retest will be made on the 18th of October.

August 18th and 19th he went to Rosemount and Lebanon townships, in Dakota county, for the purpose of assisting local health officers in dealing with an outbreak of hog cholera, and also to investigate a disease that had appeared among cattle. In a herd of seventeen cattle he found five dead. The diagnosis was, infectious meningitis. The bacteriological laboratory is working on this case, and the findings may be of unusual importance.

August 25th he went to New Brighton, for the purpose of assisting the local authorities in dealing with cattle affected with actinomycosis.

August 29th he visited Wadena, for the purpose of dealing with an outbreak of hog cholera and looking after some cases of glanders, concerning which we were unable to get satisfactory information from local health officers. The records for the glanders cases were cleared up, the hog cholera was quarantined, and local health officers were assisted and instructed in this work.

September 1st to 4th he went to Staples and Little Falls.

His work during fair week has already been mentioned.

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September 16th to 18th he finished up some glanders work in Aitkin county.

September 26th and 27th he was at Belgrade, investigating a disease that had appeared among horses in pasture, and which was proving quite fatal.

As a rule, the railroads have treated us very fairly in the way of transportation for Dr. Brimhall.

It has been my thought that we might make this field work helpful to the stock interests throughout the state without injuring our regular work bearing upon infectious diseases. For example: A disease appears among horses, as at Belgrade; a number of horses have died, and the farmers are very much alarmed and appealing for help. Such a case may or may not come within the list of infectious diseases, and yet, if Dr. Brimhall is able to give help, I have thought best that he should do so; being careful, of course, that this should not conflict with his regular duties.

The Bureau of Animal Industry has been of material assistance to us during the last quarter. Dr. McBride of South St. Paul and Dr. Keane of New Brighton have both furnished important information concerning infectious diseases of animals at their respective stations, and have given us much valuable assistance.

Mallein and tuberculin are coming into more general use. Local health officers appreciate that we have in mallein an accurate diagnostic agent for glanders, and it is not regarded with the suspicion that formerly rested upon it. Breeders are occasionally asking for tuberculin with a view to having their herds tested, and it is not uncommon now for them, when purchasing young cattle, to buy subject to this test.

At the combined meeting of the United States Veterinary Medical Association, the Association of Experiment Station Veterinarians, and the Association of Veterinary Faculties, it was my privilege to present one paper on the "State Control of Hog Cholera," and another on "The Experiment Station Veterinarian as a Member of the State Board of Health." You will be pleased to learn that our law dealing with the infectious diseases of animals is regarded by prominent veterinarians all over the country as one of the best in existence, and is already serving as a model for other states. For instance: Nebraska veterinarians and stockmen will try to secure at the coming legislature a law modeled closely after our law relating to infectious diseases of animals.

M. H. REYNOLDS, M. D., V. M.,
Director.

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PAPERS BEARING UPON SANITATION.

By Members of the Minnesota State Board of Health.

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SANITATION FOR THE STATE, BY THE STATE.

BY FRANKLIN STAPLES, M. D., PRESIDENT OF THE MINNESOTA STATE BOARD OF HEALTH.

State medicine in the United States, as in other countries at the present time, exists as an integral part of the state and national government, and has the support of the same. Aside from the humanitarian view which is entertained, the value of human life to the state is considered, as well as that of property, and means are provided for the better protection and development of both. It is believed, moreover, that no more important department in the government of any state or country exists than that which is known as state preventive medicine. Yet, considering the present magnitude of this department, its institutions, and its present important place in the body politic, together with the recent date of its birth, the rapidity of its growth from the beginning has been truly phenomenal. But a little more than fifty years have elapsed since the world's first public health enactments were made,—this being in England in 1842. At the present time, the established health departments, municipal, state and national, are among the most important features in nearly all governments. The scope of governmental control in matters pertaining to public sanitation, the prevention of disease, and the preservation of human and animal life, extends from the township, village and city to the state, thence to the nation, and finally has its international functions and relations. Already the character or degree of perfection of state medicine in a city, state or country, and of what pertains thereto, has come to be regarded as a criterion of the general intelligence and good government of the people.

The State of Minnesota was among the earlier states of the Union to inaugurate its system of preventive medicine. Its state board of health was organized and began work in 1872. Its record of over a quarter of a century has been made, and covers the time from the early youth to the more mature manhood of state medicine in this country, and its part in the general work and development in the nation has been important.

PLAN OF OPERATION.

The Minnesota state board of health has under its control general sanitation as relates to man and beast, and also vital statistics. The work of the board is carried on through an executive depart-

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ment, a veterinary department and a bacteriological laboratory. Prior to 1896 the secretary, as the executive officer, had the responsibility of all these departments, but in the spring of that year a bacteriologist was chosen, who afterwards became the director of a laboratory equipped and conducted out of the general funds of the board. In 1897 a veterinarian was appointed as a member of the board. Following this the veterinary department was created, and veterinary matters were placed under his control, he serving as director. By this move the need of legislation looking to the appointment of a state veterinarian was made unnecessary. Still further, the director of this veterinary department is also the veterinarian of the state experiment station. This combination secures the greatest possible good to the state, with the least expense, judging from the veterinary standpoint. The veterinary department has great importance from an economical and financial point of view in this state, where stock-raising is such a prominent industry. This, aside from any bearing that it may have upon general sanitation, through the efforts that are being put forward to control the transmission of infection from animals to man, and vice versa. There is careful inspection and quarantine, throughout the state, of animals suffering from any infectious disease. This is carried on through local boards, acting under the advice of the state board; or under the direction of an expert veterinarian employed by the state board, and sent to look after specially perplexing or obstinate cases. Veterinarians are also employed, as the financial conditions will permit, to go from place to place throughout the state, instructing local health officers as to how and when they shall act in dealing with diseases among animals.

The bacteriologicial laboratory has resting upon it the responsibility of clearing up doubtful diagnoses as related to infectious diseases among men or animals, together with investigation and research work. For several years a study has been made in the department concerning bacteriology in its relation to preventable diseases, both in man and in animal. There is good reason, after what has already been done by scientists, in designating the present time both as the "bacteriological era" and the "period of preventive medicine." Late advances in the knowledge of bacteria as disease causes, and concerning the part they play in the transmission of disease from animal to man, have together largely extended the domain of state medicine. What has appeared concerning the existence and character of disease germs, their conditions of life, means of propagation, and behavior as specific disease causes—in other words, the etiology and pathology of germ diseases—has come to be

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the foundation of a large part of modern scientific medicine. Thus it is that work in bacteriology in the last decade has not only widened the field of pathology, bringing into possession of the world of science a new territory of vast extent and great value, but has pointed to possibilities in the future of preventive medicine, the extent of which may now be imagined but not fully estimated. There is now a large literature of medical bacteriology and an army of laborers in this department, representatives of which are found in all countries where learning and advanced science have any considerable place. Already in several of the states, in many of the larger cities, and in the Canadian provinces, as well as in countries and cities abroad, bacteriological laboratories are established and supported by national and state health authorities.

WAYS AND MEANS.

There are three principal directions in which the means of prevention have been employed, especially against the advance of communicable diseases. (1) In reducing the source of infection propagation to the minimum by means of sanitation, shown in the sanitary care of houses and house surroundings and in the purity of the air of the dwellings, school-rooms and places of public gathering, as secured by proper ventilation; improvements in sewerage and house plumbing, under authoritative inspection and direction; the examination of food products and water supply; the condition of public conveyances; the best methods for the transportation and disposal of the dead, etc. (2) In preventing the passing of the contagium by authoritative isolation of the infected. (3) By securing immunity to disease in the individual, when necessary, by artificial means. In each of these departments of work a practical knowledge of bacteriology, of the character, behavior and possible management and destruction of disease germs, has come to have an important place.

In the first department of sanitary work here noticed the knowledge of what constitutes a means of propagation, such as filth on persons and in and around dwellings, decaying animal and vegetable matter, and the want of pure air and sunlight in basements, as aids, for instance, in the growth of the bacillus of diphtheria and of other infectious diseases, has laid the foundation and led to the enactment of laws authorizing and compelling sanitary inspection, with provisions for correcting and improving unsanitary conditions by state and municipal authorities. It is here observed that the authoritative cleansing of private houses, public places, persons,

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animals and things, has an important result for good in the educational influence which necessarily attends the same.

The importance of effort in the above-mentioned second department of sanitary protection from disease—the passage of contagion—is seen in what now exists in international, state and municipal quarantine, with the amount of governmental expenditures for this purpose. The financial view is, that the loss of life and property, incidental to the existence of pestilential disease, is much greater to the state than the cost of defense.

Only a brief mention may be made of what is now known and practiced by way of rendering the body incapable of contracting infectious disease. Animals may be rendered immune to specific infection by the injection of the attenuated virus of the particular germ. The discovery of this fact was made by the late distinguished French scientist, Pasteur, who, in 1880, experimented with fowls in the disease known as "chicken cholera."

State and national organization, by coöperation in sanitary matters, reap great benefit in the matter of sea-coast and interstate notification of the suspected approach of disease infection, as transmitted in the persons or goods of immigrants, or otherwise.

THE BACTERIOLOGIST AND PATHOLOGIST IN MEDICINE.[1]

BY HENRY M. BRACKEN, M. D.,

Professor of Materia Medica, Therapeutics, and Clinical Medicine, University of Minnesota.

Every medical man appreciates, or should appreciate, the importance of the study of bacteriology and pathology. Through their aid the diagnosis of disease may often be assured where formerly there would only have been a diagnosis by conjecture. They make the scientific treatment of disease possible. The physician or surgeon of the present day who is unable to utilize these scientific guides is in a pitiable plight. The medical schools, recognizing these facts, now make it possible for every medical student to acquire a sufficient knowledge of these subjects to serve him as aids in diagnosis when he enters upon his professional work.

But this is the age of specialization in medicine, and there are excellent reasons for specializing bacteriology and pathology. While

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[1]Read before the Minnesota State Medical Society, Minneapolis, June 17, 1896.

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the general practitioner may have sufficient knowledge of these subjects to use them in his daily duties, he may have neither the time nor the conveniences for going carefully into the necessary detail, and he should be glad to find those who are willing to devote their whole time to such scientific investigation, to whom he can turn for advice. As a matter of fact, these subjects are specialized, and we find in the bacteriologists and pathologists of the present day scientific consultants who should command at one and the same time our respect and their legitimate fees. The possibilities for carrying out such a line of specialization should be as great as in any other branch of medical work. But are they? Do the bacteriologists and pathologist secure proper recognition? I think not. How often do we meet with experiences quite similar to that of the following illustration: A physician with a doubtful case of pulmonary tuberculosis, where an absolute diagnosis without bacteriological investigation is impossible, but where an absolute diagnosis is of the greatest importance to the patient. The physician in charge sends a quantity of sputum to the bacteriologist for examination. The examination is made; a positive diagnosis is given. The patient is governed in his manner of life and place of living by the diagnosis of the bacteriologist, and recovers his health. Both the patient and the attending physician should be very grateful to the bacteriologist for his opinion, which practically was the means of saving the patient's life. Notice now the amount of appreciation shown by them. The bacteriologist asks for a modest fee, with the result of calling down upon himself abuse from both physician and patient. The patient says: "I was quite satisfied with my attending physician, and was quite willing to follow his advice without your opinion. I do not recognize your right to a fee." The attending physician says: "My dear sir, you have done nothing remarkable. I could have made the examination of the sputum myself had I cared to take the time, but I thought that you, with your laboratory conveniences, would be only too glad to do such a little thing as that as a matter of professional courtesy to me." The bacteriologist thus gets nothing but abuse for his painstaking work. The physician who has not been willing to reward science regards the scientist whom he has been treating in such an unprofessional manner with a feeling of contempt, and possibly of pity, because he prefers to follow such a life work rather than to make himself a practicing physician. So, too, with the pathologist. He is not given his proper place. For example: A surgeon with a case requiring an operation is in doubt as to the proper course to pursue, or as to the probable outcome of an operation. He calls another surgeon

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to meet him in consultation over the case. The consultation may be of advantage to the attending surgeon; it may be of advantage to the patient; it may be of little benefit to anyone. The consultant, however, is respected by the attending surgeon as well as by the patient and his friends. Without regard to the outcome of the consultation, the consultant expects his fee,—often a good round one,—and gets it. Contrast with this consultant the pathologist who may be called upon by the surgeon to clear up a doubtful diagnosis in a case where the true character of the disease should be known, if possible, before an operation is performed, in order that the surgeon may determine the limits and character of the operation to be performed. It may also be a case in which it is desirable that the patient or his friends should know the true character of the disease in order that matters of greater or less importance pertaining to the patient may be regulated accordingly. The pathologist, after making a most careful examination, requiring a great deal more time and quite as much skill as that given by the consulting surgeon already referred to in our illustration, gives an opinion that determines the action of both surgeon and patient. The attending surgeon, the patient, and the patient's friends are well satisfied with the pathologist's opinion. The pathologist sends in a request for a modest fee,—quite modest as compared with the consulting surgeon's fee,—thinking that of course it will be paid willingly. Not so, The patient says: "I did not care for your opinion. The responsibility was upon the attending surgeon. I had perfect confidence in him. It mattered little to me what the outcome of his action would be." The surgeon says: "The patient is quite right in objecting to your fee. It is outrageous for you to make such a charge. I asked for the examination simply out of curiosity. I would have operated without an opinion from you as to the true condition of the patient, and the result would probably have been quite as successful. I simply thought you would be pleased with the opportunity for making such an examination." Thus the poor pathologist goes unpaid, while the consulting surgeon was well paid. And yet, of these two consultations just described, which had the greater probable value—the one which was only an expression of judgment or the one which was a statement of facts? It is thus, in too many instances, that the general practitioner stands to the scientific medical man. He recognizes and acknowledges the importance of scientific investigation; he appreciates the fact that he has neither the time nor the ability to make such investigations so carefully as can the man who gives his entire attention to scientific matters; but he is not willing to give the scientist the position of a consultant, so far

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as to demand for him his legitimate place and compensation. It is time that the bacteriologist and the pathologist were recognized as consultants of a high order. The work requires their constant attention. They must be not only observers but investigators. The results of their investigations have much to do with our knowledge and treatment of disease. The medical man who chooses to follow the life of a scientist rather than that of a practitioner is generally making a financial sacrifice, and we should not increase this burden by expecting him to give us and our patients the benefit of his knowledge without compensation. We should show our appreciation of his work whenever we have opportunity.

So much for the relationship of the scientific specialist in medicine to the general practitioner. There is still another point of view from which we must observe him. One of the functions of state medicine is to prevent or limit the spread of infectious diseases among men and animals. For this purpose all suspected individuals should be subjected to a most rigid inspection. The statement that an infectious disease exists in a given case means the quarantine of the infected individual, or even, in cases of certain infectious diseases among animals, the death of the infected one. At best, quarantine is a hardship. It is often the cause of considerable financial loss. Interested parties have a right to demand a most careful examination of the suspected one before quarantine is forced upon them; an examination that in many instances cannot be thorough without the aid of the bacteriologist. This fact is so generally recognized at the present time that state and municipal boards of health appoint expert bacteriologists to investigate all suspected cases of quarantinable diseases among men and animals. Please notice the limit of responsibility of bacteriologists holding such appointments. It extends only to quarantinable diseases. We may demand of the state or municipal bacteriologist an inspection of tuberculous animals, because tuberculosis among animals is a quarantinable disease, but we have no legal right to ask for an investigation of a tuberculous suspect among men, because this condition is not yet classed as one subject to quarantine, and is therefore not under the control of boards of health. If such an investigation is asked for in the case of a human being, the bacteriologist is then in the position of a consultant, and should be recognized as such. It is worthy of note, however, that tuberculosis among mankind, typhoid fever, and certain other diseases not yet subject to quarantine, cannot too soon be placed, by the proper authorities, under the surveillance of the bacteriologist.

The appointment of bacteriologists for work of this nature should be more general. There ought to be a bacteriologist in every

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city or town throughout the state, in order that prompt examinations might be made when necessary. Of course, such work can be referred by local boards of health to the state bacteriologist, but this often involves a considerable loss of time. It might not be wise to ask of every local board of health the appointment of a salaried bacteriologist, but it should, when possible, appoint some competent physician to whom proper subjects for investigation might be referred. The state bacteriologist would then be in a position to advise and consult with the local bacteriologists. Many an outbreak of diphtheria or other infectious disease among men, or of tuberculosis, cholera, etc., among animals, might be prevented by the prompt action that would be possible were such appointments common. There is a danger from the appointment of incompetent men to fill these places of responsibility, but such dangers should not and will not exist when the medical profession fully appreciates its duty in preventive medicine. It is true that at present it is not always possible to find a competent bacteriologist in all places where an appointment should be made. Of course, under such circumstances no appointment should be made, for a poor bacteriologist is worse than no bacteriologist at all; he is a very dangerous quantity. This fact simply emphasizes the importance of our medical schools giving more attention to instruction in medical subjects bearing upon preventive medicine. In fact, a special course in state medicine should be a common feature of medical education. It is especially true in medicine that "an ounce of prevention is worth a pound of cure," and this fact should be impressed upon all sanitary authorities, upon the medical profession, and upon the laity.

SHOULD MEASLES BE QUARANTINED?[1]

BY HENRY M. BRACKEN, M. D.,

Professor of Materia Medica, Therapeutics, and Clinical Medicine, University of Minnesota.

Quarantine against disease among human beings is carried out in one of two ways: First, by complete isolation of any person suffering or convalescing from an acute contagious disease; second, by isolating a dwelling in which a contagious disease exists.

To accomplish the first, quarantine hospitals are established.

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[1]Read at the Buffalo meeting of the A. P. H. A., October, 1896.

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This is the only means by which much benefit can be secured through quarantine, but it is seldom employed except against the most virulent type of infectious diseases, such as smallpox or cholera.

To accomplish the second, a placard is posted upon a house, stating that a certain specified infectious disease exists in the house, and that all persons excepting physicians and clergymen are prohibited from going in or out of the house under penalty of the law. This system, although defective, is the one generally employed when dealing with scarlet fever, diphtheria and measles.

Quarantine is intended for the benefit of those who are well, but who are susceptible to infection. In employing the house quarantine method, however, an error is committed in the very act, for in all probability healthy individuals subject to infection will be shut up with the infected, thus augmenting the dangers of exposure. In the houses of the poor, where the sick and the well are often compelled to live in the same room, and even to sleep in the same bed, the risk is especially great. House quarantine often increases the danger of spreading disease, for those who are well but subject to infection, dreading the hardship of confinement with the sick, often leave the house before the quarantine is fully established and find temporary homes elsewhere. If such persons, after their removal, are taken ill with the disease, they establish new centers of infection.

In most cases of house quarantine it is impossible to prevent uninfected inmates from going to and from their home to their place of business, traveling often in public conveyances. They are thus in danger of carrying, as well as of receiving, infection. It is in this point that the first system of quarantine is superior to the second. By removing the infected person, it protects the other residents of the house, and, through them, the public, from danger. This is especially true of those diseases that are easily communicable by a second to a third party.

So much for kinds of quarantine. We now come to discuss the necessity of quarantine in various diseases.

It is well to enforce strict quarantine against scarlet fever, for at the outset of the disease the danger from the contagium is slight. If a true diagnosis is made early and a thorough isolation is established and maintained, there is a strong probability of the infection going no further. Another reason for enforcing quarantine against scarlet fever is the fact that the disease, while not absolutely limited to childhood, is not common in adult life. Still further, the

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mortality from scarlet fever is, as a rule, rather high, and we are under obligations to use any means, however inadequate, that will tend to prevent loss of life.

It is our duty to enforce quarantine against diphtheria, because of its virulence, if for no other reason. Fortunately, with this disease, as with scarlet fever, an early diagnosis is possible, and the danger of spreading the infection to others can be removed by the thorough isolation of the patient. Diphtheria is not confined to childhood. One attack does not confer immunity against another, and yet the high mortality attending this disease demands the most careful precautions against infection.

With measles, on the other hand, the conditions are quite different; the first method of quarantine is not called for, and the second is a complete failure. During the prodromal stage of this disease, the dangers from infection are quite pronounced, therefore the patient has often thoroughly exposed a great number of people in school and other public places before the character of the disease has been recognized. To quarantine a person under these conditions is like the proverbial locking of the stable door after the horse has been stolen. Not only is quarantine against measles ineffectual, but it is unnecessary and ill-advised; partly because the mortality from measles is not high, provided the patient receives ordinary care, and partly for another reason, which I shall now proceed to explain.

The adult who has not had measles is quite as susceptible to infection as the child. The man who has escaped the disease during childhood incurs the annoyance of trying to avoid it during the rest of his life. The child can, as a rule, be ill without much inconvenience. It has no business cares; it probably has a home, and friends to care for it. An ordinary attack of measles means to such a child nothing but a short period of bodily discomfort. Not so with the adult. The sacrifice of business interests intensifies the discomfort of every day of illness. Separation from family surroundings—a condition so general with the young business people of our great cities—makes sickness under any circumstances a great inconvenience. When the disease is infectious, this inconvenience is much increased, for under these circumstances the invalid is looked upon as a nuisance, and is often urged to leave the house, at the hazard of his own life and of the health of others. To protect the child from measles, therefore, is an act of very questionable kindness.

Still other objections to house quarantine against measles appear

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on further study. First, it discommodes the household unnecessarily. There is but little danger of measles being carried to a third party by those going to and from a house where the disease exists; it is unnecessary, therefore, and practically impossible to compel individuals who are in no way liable to infection, or to carry infection, to remain closely quarantined in a placarded house as a means of protection to others.

Second, it excludes children unnecessarily from school, for it is often the rule in towns that practice house quarantine to exclude from school for a specified time *all* children living in an infected house. This is unjust to the children who have already had measles and are in no way liable to spread infection; it is also unjust to children of other families living under the same roof, who are not themselves suspected of disease.

Third, it puts a premium upon the practice of avoiding quarantine by not calling a physician at the outset of the disease, and thus endangers the life of the patient. In their ignorance, the parents or guardians of the patient reason as follows: "This is probably a case of measles; if we call a physician he will have the house placarded, and we shall be subjected to all of the associated inconveniences of quarantine. If we do not call a physician we need not be quarantined. Measles is not a dangerous disease. We will call no physician at present, and will thus avoid quarantine. If necessary, we can call for medical aid later." As the result of such action, the patient is neglected; the disease takes an unfavorable turn. The physician is finally called. The patient now has bronchitis, or pneumonia, or tuberculosis, and after a time dies. The family loses a child; not of measles, according to the death certificate, but of some other disease, and "an all-wise Providence" is charged up with a death which was really due to the negligence of the parents or guardians. The system of quarantine has killed the patient, and the tables of vital statistics suffer another strain upon their reliability.

The greatest danger from measles is from the effects of the so-called complications, or from sequelæ. Every case of measles should be looked after from the outset by a physician. Daily professional visits may not be necessary, but the laity should understand that measles is a disease not free from danger, and that the responsibility connected with it should rest upon a physician rather than upon the parents or guardians of the patient. Proper advice from a physician at the outset of the disease may prevent the appearance of dangerous complications or sequelæ. Neglect of such advice may be followed by the death of the patient.

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Fourth, it puts a premium upon lying. The family that avoids calling a physician for fear of having the house quarantined knows at the time that the case is one of measles. It overlooks one fact, however, in neglecting to report the case to the health officials, viz.: That the demand on the part of the law requiring the report of an infectious disease applies to householder as well as to physician. The delinquent householder is therefore subject to a fine. If an effort were made to enforce the penalty, the defense would probably claim that the failure to report the case was due to ignorance of the nature of the disease. This is not true, for the fact that the disease *was* recognized as measles was the very reason for not calling a physician. The same set of symptoms, unaccompanied by at least a probable diagnosis of measles, would have sent a messenger post haste after a physician.

Fifth, the quarantine of measles tends to make physicians law breakers. When the law, under penalty, requires that a report of the existence of the disease be sent to the health office, it is not an uncommon thing to find physicians who ignore the law. By this act physicians not only break the law, but they degrade their profession in the eyes of the public. They also make it more difficult for conscientious physicians to perform their duty in reporting cases.

What should be done, then, by health officials in dealing with measles? Simply placard the house without establishing any system of house quarantine. There are individuals who, on account of already defective health, should avoid exposure to sickness. There are those who do not wish to be ill under any circumstances, and who would naturally, if possible, avoid infection from measles. A placard simply stating the existence of measles in the house would be a sufficient warning to all such persons, while it would be no barrier to the free communication of friends who had no occasion to shun the disease; nor would it deter the sound members of the household from attending to their daily duties away from the home as usual.

Were such a system of placarding followed, a physician would be more frequently called at the outset to cases of suspected measles, and there would be a tendency to lessen the dangers that often attend this disease. This would accomplish more than the rigid quarantine which many of our cities and towns pretend to enforce, while at the same time it would not subject the honesty of householder or physician to too great a strain. It would, in short, be more conducive to honesty on the part of both householder and physician.

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SHOULD THE TUBERCULOUS INSANE BE ISOLATED FROM OTHER INMATES IN OUR ASYLUMS, AND ACCOMMODATIONS PROVIDED FOR THEM IN SEPARATE AND DETACHED BUILDINGS?[1]

BY H. M. BRACKEN, M. D., SECRETARY AND EXECUTIVE OFFICER MINNESOTA STATE BOARD OF HEALTH.

Truly it seems like an unnecessary question, when we consider the infectious character of this disease. Why not ask, Shall we kill off our insane? If this were answered in the affirmative, we might then ask, Why not choose some more humane method of destroying these unfortunates than by forcing upon them the slow torture of this slowly progressing disease? Why not, in preference, produce euthanasia by means of morphine or some kindred acting drug?

Would we think of allowing those suffering from smallpox, from diphtheria, from yellow fever, to be housed with the uninfected? Then why should we consider for one moment the question of subjecting the non-tuberculous insane to an exposure more deadly in its effects than that of any of these diseases?

But you may say there is a close relationship between tuberculosis and insanity. That there is a so-called phthisical insanity said to occur sometimes in persons of the phthisical diathesis, who have no symptoms of local tubercular deposit, and you may quote Maudsley as saying that, "without doubt many phthisical persons exhibit features of character in some respects peculiar." People whom he describes as "quick, irritable, fanciful, idealistic, but unstable of purpose; brilliant in flashes, but wanting in breadth and calm depth of thought; quick in insight and intense in energy." People with "a sort of hectic in their thoughts, feelings and actions."

You may tell me that, "with phthisis there commonly goes a particularly intense, impulsive and sanguine temperament, which may breed a more insanely disposed temperament in the offspring, apart from any influence which the actual tubercular tendency may be supposed to have or to have not."

You may quote Clouston, who, "more than thirty years ago, described a form of insanity peculiar to persons of the phthisical type and their offspring," and who has further stated that, "the hereditary disposition to insanity existed in seven per cent more of the insane who were tubercular than of the insane generally."

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[1]Read at the conference of the state boards of health, Nashville, Tenn., Aug. 18, 1897.

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You may quote Dr. Strahan, who says, "that the phthisical and the insane diatheses are interchangeable is proved to the asylum physician every day."

You may excuse neglect of isolating the tuberculous insane on the score that the ordinary distressful symptoms, pain, dyspnœa, cough, hemorrhage, etc., are generally absent among the insane.

You may tell me further, that, "Tuberculosis is the *assigned* cause of death in from twenty-eight to thirty-three per cent of the whole number of deaths in many lunatic asylums," and yet that, "Phthisis is probably the *assigned* cause of death in only a little more than half of the cases in which tuberculosis is present."

You may use all this evidence to prove the uselessness of the precautions that are ordinarily taken to prevent infection from tuberculosis.

Admitting these statements to be true, we may still ask. Are we justified in housing the tuberculous and the non-tuberculous insane together? I think not. But must we admit these statements unqualifiedly? It is not becoming in me to criticise the conclusions of such eminent alienists as I have quoted, but may I suggest that, had their study of tuberculosis among the insane been carried on with our present knowledge of this disease, their line of reasoning and their final conclusions might have been quite different.

Let us hear some testimony from the other side.

In a paper by Dr. Geo. H. Rohé, upon sanitation in hospitals for the insane, he says: "The greatest scourge of these institutions is tuberculosis, and I fear the apathy with which this disease is regarded by physicians in charge of the insane is largely due to the prevalent belief that there is an etiological relation between phthisis and insanity. I am convinced, however, that unprejudiced observation will show that the prevalence of tuberculosis in hospitals for the insane is due to the great facilities for infection and the lack of attention to the means of restricting the same. The A. P. H. A. has, by the report of its committee on restriction of tuberculosis, pointed out the means of limiting the spread of this disease. By the adoption of these means the percentage of tuberculous deaths to the general death rate in one hospital has been reduced in the course of three years from an average of twenty-five per cent to a fraction under nine per cent."

I was interested in this hospital report from Doctor Rohé, the Maryland hosptial at Catonsville, and wrote to Doctor Wade, his successor, to learn the present condition of the tuberculous patients. He informs me that the death rate from tuberculosis for 1896 was but 6.1 per cent. Doctor Wade describes the manner of caring for

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the tuberculous insane in this hospital as follows: "The sputa of the suspected case is examined, and if the bacilli are found the patient is placed in a single room, the walls of which are painted and can be easily disinfected. The furniture consists of an iron bedstead, which is readily cleaned. There are no curtains to the windows and no carpet on the floor. The patient is persuaded, if possible, to expectorate into a vessel, which is disinfected with mercuric chloride. If the patient expectorates about the room no harm can be done, however, as everything can be readily washed with a disinfectant. The bedding is properly cared for, and is used for no other bed. After the death of the patient the room and all of its contents are thoroughly disinfected."

It may be well to place Doctor Wade's opinion, relating to tuberculosis among the insane, against the older views which I have already given. He states, as reasons for a high mortality from this disease in these hospitals: First, the fact that the physical condition of the insane patient is very much depleted on admission; second, the necessary confinement in the building; third, the difficulty of isolation; fourth, the lack of proper care and disinfection; fifth, the fact that many of the patients do not complain of their ailments and that the tuberculous process is well established before discovered.

Doctor Tomlinson, superintendent of the state hospital for the insane at St. Peter, Minn., believes in the transmutation of insanity and phthisis. At the same time, he believes that most of the cases of tuberculosis in these hospitals originate by infection while in the hospital, and that patients having a direct heredity of phthisis are not likely to die from this disease. In proof of this he quotes from the hospital's statistics as follows: "During a period of two and a half years, out of 695 patients admitted, seventy had a history of phthisis in the family. Five patients were suffering from phthisis when admitted. During this same period, nineteen patients died of phthisis, *and not one of these had an heredity of that disease.*"

He believes that the *materies morbi* for tubercular infection is always present in the old style hospital, and that the poor hygienic surroundings, due to over-crowding, have much to do with its development. This is illustrated by the fact that at times a patient, who becomes infected with tuberculosis and is rapidly failing, may improve and apparently recover when placed under better sanitary conditions.

In concluding, let me offer the following propositions:

1. The old ideas relating to the interchangeable character of the phthisical and insane diatheses are not worthy of consideration

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when the question of isolation of the tuberculous in hospitals for the insane is under discussion.

2. The old ideas as to the close relationship between tuberculosis and insanity furnish the only excuse (and a very poor excuse it is) for the non-isolation of the tuberculous insane.

3. The insane should be classed as *irresponsible* invalids, and the course pursued by those who have them in charge should be regulated accordingly.

4. The insane may be more susceptible to the infection of tuberculosis, for reasons already given, and, consequently, the means taken to prevent such infection should be most thorough.

5. The question of controlling the sane tuberculous may be a difficult one to settle, for the actions of the infected ones cannot always be restricted. It is quite the reverse with the insane. Their manner of life is under control, and without any additional hardship to these unfortunates, the danger of spreading infection can be reduced to a minimum.

6. There can be no doubt but that most of the tuberculosis in hospitals for the insane is the result of infection.

7. Over-crowding in these hospitals is one of the chief causes of the high mortality and the general infection from tuberculosis.

8. Those who have charge of the insane, governments, hospital trustees, and superintendents, are responsible for their care. Exposure to tuberculous infection, through carelessness or indifference on the part of such guardians, should be considered as criminal negligence.

Dr. Felix Formento, New Orleans, La., offered the following resolution:

Resolved, That it is the sense of this conference that tuberculous patients should be isolated from other inmates in our hospitals, asylums, prisons and penitentiaries.

Upon motion, properly seconded, resolution was adopted.

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LEPROSY IN MINNESOTA.[1]

BY H. M. BRACKEN, M. D.,

Professor of Materia Medica and Therapeutics, University of Minnesota; Secretary and Executive Officer of the Minnesota State Board of Health.

In Allbut's "System of Medicine" (Vol. III., p. 46), referring to the Norwegian lepers of Minnesota, Wisconsin and Dakota, it is stated that these have diminished from 160 known cases to about a dozen. This statement is undoubtedly taken from the report of Dr. G. A. Hansen of Bergen, Norway (1888), who says, "of about 160 lepers who have immigrated into three states (Wisconsin, Iowa Minnesota) thirteen are alive, whom I have seen myself, and perhaps three or four more. All the others are dead"[2] This statement refers to the *known* lepers that left Norway and settled in the Northwestern States. At another time, Dr. Hansen says: "The number of immigrated lepers from Norway is much greater than I had any idea of from the knowledge I could gather at home. My friends, Dr. Hoegh and Dr. Gronvold have given me the names of many lepers here in America whom we did not know to be lepers when they left Norway." The figures quoted from Allbut's "System," therefore, refer to those only who were known to be leprous when they left Norway, and hence are misleading, as well as incorrect. In 1886 the Minnesota state board of health first reported upon the lepers of the state. An attempt has been made since that date, and I think with fair success, to keep a record of all lepers in the state. The accompanying table (p. 275) will serve as an interesting text:

We have knowledge of fifty-one lepers having resided in Minnesota. Of these seventeen had died before 1890. Of the thirty-four added to the records since 1890, eighteen were first reported upon in 1891, two in 1892, three in 1893, two in 1894, two in 1897, and seven in 1898, to date (September 15th). Little is known of the nationality of the seventeen who died before 1890, but from various reports it is safe to presume they were all from Norway. Of the later thirty-four, twenty-nine were probably from Norway and five from Sweden. Of the five from Sweden one was reported first in 1894, the other four in 1898.

Of those who might have belonged to the 160 *known* lepers that immigrated from Norway previous to 1888, this list cannot include

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[1]Read at the Ottawa meeting of the American Public Health Association, October, 1898.

[2]Ch. Gronvold, M. D., Report, July 1, 1894.

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No.	Nationality.	Disease appeared in Europe.	Disease Appeared After Coming to America.												Date of		Age.	Sex.	Married.	No. of Children.
			1 Year	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.	9 Yrs.	10 Yrs.	11 Yrs.	12 Yrs.	13 Yrs.	Over 13 Yrs.	Birth.	Death				
1	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	1831	1880	.....	m.	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1822	1878	.....	m.	.....	.....
3	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1843	1878	.....	m.	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	1876	1878	.....	m.	.....	.....
5	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1846	1878	.....	m.	.....	.....
6	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1848	1878	.....	m.	.....	.....
7	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1815	1877	.....	m.	.....	.....
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1848	1868	.....	m.	.....	.....
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	1825	1885	.....	m.	.....	.....
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	1854	1885	.....	f.	.....	.....
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1839	1884	.....	m.	.....	.....
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1853	1886	.....	m.	.....	.....
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Bet. 1818-28	1888	.....	m.	Married	.....
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Bet. 1848-68	1888	.....	m.	.....	.....
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Bet. 1829-39	1889	.....	m.	Married	.....
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Bet. 1858-68	1889	.....	m.	Single	.....
17	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1849	1890	.....	m.	Married	.....
18	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1842	1890	.....	m.	Married	.....
19	Norwegian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1816	1892	.....	m.	Married	5
20	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	1854	.....	.....	m.	Single	.....
21	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	1830	.....	68	m.	Married	1
22	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1840	1896	.....	m.	Single	.....
23	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1848	1896	.....	m.	Married	5
24	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1820	.....	78	m.	.....	.....
25	Norwegian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	1834	.....	64	m.	Married	6
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	1857	1894	.....	m.	Married	3
27	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1838	189–	.....	m.	Married	2
28	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1840	.....	58	f.	Married	6
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1843	1897	.....	m.	Married	3
30	Norwegian	Yes?	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1864	.....	34	m.	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1850	189–	.....	m.	Married	Some.
32	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1850	1892	.....	f.	Married	.....
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	1834	.....	64	m.	.....	.....
34	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	1857	1894	.....	m.	Married	6
35	Norwegian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1838	189–	.....	m.	Married	3
36	Norwegian	Yes	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	1826	.....	72	m.	Married	2
37	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	.....	.....	.....	.....	Single	.....
38	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	1860	.....	38	m.	Married	3
39	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1853	1897	.....	m.	Single	.....
40	.....	?	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1845	1894	.....	f.	Married	6
41	Swede	?	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1845	1897	.....	m.	Married	2
42	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	1860	.....	38	m.	.....	.....
43	Swede	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1865	.....	33	f.	Married	4
44	Norwegian	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	1867	1897	.....	m.	.....	.....
45	Norwegian	.....	.....	.....	Yes	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	1848	.....	55	m.	Single	.....
46	Swede	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	1861	.....	37	m.	Married	2
47	Swede	.....	.....	.....	.....	.....	.....	Yes	.....	.....	.....	.....	.....	.....	.....	.....	1858	.....	40	m.	Married	5
48	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1862	1890	.....	f.	Single	.....
49	Swede	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	1845	.....	53	f.	Married	4
50	Norwegian	Yes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1863	1898	.....	m.	Married	1
51	Norwegian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	.....	1843	.....	55	m.	Married	8

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more than seventeen. There is a possible total of twenty-nine cases in whom the disease first appeared in the old country, but it is not at all probable that more than twenty-two of these were included in Dr. Hansen's list of 160.

Undoubtedly some of those who have reported the disease as first appearing after they had landed in this country have not told the truth. It would be fair, probably, to say that twenty-five of the fifty-one Minnesota lepers had the disease before leaving Europe.

Twenty-one is probably the highest number of lepers known to have been living in Minnesota in any one year (1893). At present thirteen are known to be living in the state. There may possibly be three more living, from whom we can secure no reports at present, and in addition a few unrecorded cases. Of these fifty-one known cases but nine were females. Of the latest record (thirty-four cases) twenty-one are known to have been married (fifteen men and six women), and twenty of these married lepers had children. It is quite possible that the other one (a woman) had children also. These twenty-one married lepers had from one to eight children each. We have knowledge of at least seventy-eight children born to these lepers. It is not known how many of these children were born after the parent was recognized as leprous, but it is safe to say a large proportion of the seventy-eight. Not one of these seventy-eight children has become leprous, and in no case has the leper transmitted the disease to the companion in wedlock. In twenty of these lepers the disease is said to have been the anæsthetic form, in twenty-three the tubercular form, while for eight the type of the disease is not given.

Of the thirteen lepers known to be living, I can give an outline of the present condition of but six, as follows:

No. 43. Mrs. D. Born in Sweden. There is no history of leprosy in her family. Her husband, a Norwegian, states that the newspapers have reported a case, or cases, of leprosy near her home in Sweden since she left there. She landed in America (Philadelphia) in 1887, and was married in the fall of the same year at Warren, Minn., The first symptoms of leprosy appeared soon after the birth of her second child, in 1891. There was then swelling of the hands, feet and face. On March 24, 1898, inspection showed the following condition: Hands and feet blue, nodular, and swollen; face, "leonine;" hair falling out rapidly; eyebrows gone; sore throat; anæsthetic spots on extremities and face. There are sores on her legs and arms received from blows and burns due to the anæsthetic condition of those parts. She has four children; two born before

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the first symptoms of leprosy, two since. These are all healthy, and are aged, respectively, nine, six, four and two years. Patient is careful and cleanly in her habits. She burns all bandages used; has her own special towels, bedding, etc. She sleeps alone. The disease seems to be rapidly progressing.

No. 45. Mr. B. Born in Romsdal, Norway. Aged 55. He gives no history of leprosy in his family, but states that there were lepers near his native home. He landed in America (New York) in 1872. The first symptoms of leprosy appeared in 1874. These were anæsthesia in both hands, preceded by severe pains. The ears are slightly nodular. The disease is not progressing rapidly. There is mutilation of the fingers. Patient is not married. His habits are good.

No. 46. Mr. E. Born in Vermland, Sweden. Aged 37. When twenty years of age (1861) he worked on a log drive in Sweden with Norwegians. There is no history of leprosy in his family. He came to America in 1884. Married in 1885, and has two children, aged, respectively, eleven and eight years, both in good health. In 1892 nodules first appeared on forehead and back. In 1893, face became involved. Disease progressing, but patient is still able to follow his occupation as a tailor. He is careful in his habits.

No. 47. Mr. L. Born in Helsingland, Sweden. Aged 40. He knows of no leprous relations. He landed in America (Boston) in 1881. About 1888 anæsthesia appeared in the feet. Patient is married and has five children (girls), ranging from sixteen to eight years of age, all healthy.

No. 49. Mrs. P. Born in Vermland, Sweden (twenty-five miles from Stockholm). Aged 53. She knows of no leprous relatives or neighbors. About twenty-five years ago she landed in America (Montreal). About twelve years ago she first noticed severe pains in lower limbs. At present (1898) her hands, feet and face show marked evidence of the disease. She has had six children, four of whom are dead. The two living are aged about sixteen and twelve (both girls), and are healthy and rugged looking. The patient is not cleanly in her habits, and if the family escapes infection it will not be due to any precautions taken by her. Her husband fears the disease, and this fear may lead him and his children to protect themselves, so far as possible.

No. 51. Mr. J. Born in Norway. Aged 55. He has a brother in the leper hospital in Bergen, Norway. He came to America about twenty years ago, and first noticed symptoms of the disease about seven years ago. He is married, and has eight children, all healthy.

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The history of these six cases gives some idea of the type of leprosy found in Minnesota. It is undoubtedly possible to find such cases wherever people from the Scandinavian peninsula have settled in the States or Canada. It is very difficult to secure a clear history of the course of this disease.

Let me draw your attention to a few facts emphasized by this table and these records.

1. The impression that leprous immigrants from the Scandinavian peninsula are all from Norway is a wrong one. Five of eleven lepers placed on file by our board during 1897 and 1898 are from Sweden.

2. The feeling that we can quarantine against lepers by watching immigrants is an unsafe one. The family history of all immigrants from a country where leprosy prevails should be secured before they are allowed to embark for America, and no member of a leprous family should be permitted to land upon our shores.

3. It would appear that the conditions antagonistic to the spread of leprosy in Minnesota are also opposed to sterility, as borne out by the families of several of our lepers. (Some of these families have children, as shown by the following figures: 5, 5, 6, 6, 4, 6, 4, 5, 8).

4. It is quite possible for leprosy to die out in certain favored sections of the country, such as Minnesota, without segregation, *provided* the importation of lepers is discontinued.

5. Even in Minnesota, one has but to visit some of these lepers to feel that segregation *should* be insisted upon in all cases. One cannot but feel, on entering a filthy home and seeing a leprous mother careless in her habits, that the children are not safe.

6. Segregation in single states is not practical. It would tend simply to drive lepers from states, enforcing such a practice to those that were not carrying out the system.

7. A federal home should be provided for these unfortunates. They could thus be cared for more economically and more satisfactorily than through any state provision.

8. In spite of all precautions that we may take, there will be some leprous individuals in this part of the world for many years to come.

9. The Scandinavian peninsula does not furnish all leprous individuals found in the United States.

Great care must be exercised in dealing with lepers in the future. That we have been constantly importing this disease is a recognized fact. That the chances of importing this disease will probably be

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increased, rather than decreased, unless great care is taken in dealing with infected countries, no one can doubt. All the lepers that come to America do not settle in the Northwestern States, and all sections of the country may not be so fortunate in affording such poor soil for the spread of the disease as does Minnesota.

It is altogether probable that there are some lepers in Minnesota not registered by the state board of health. Assuming that there may be a total of twenty lepers in Minnesota,[3] it is a safe estimate, based on the United States census for 1890 of the Scandinavian foreign-born population, that there are at least twenty lepers in the four states, Wisconsin, Iowa, South Dakota and North Dakota, and probably 120 Scandinavian lepers in other parts of the United States, making a probable total of 160 Scandinavian lepers in the United States.

Basing our estimate on what is positively known to exist in Minnesota, the figures for the three divisions given would be approximately, 13, 13, 78, or a total for the United States of 104 Scandinavian lepers. If we base our estimates on the Norwegian foreign-born population in the United States, we should then have for the three districts a total of probably ninety-one Norwegian lepers.

THE PRACTICAL APPLICATION OF THE SERUM DIAGNOSIS OF TYPHOID FEVER.*

BY HENRY M. BRACKEN, M. D.,

Professor of Materia Medica, Therapeutics, and Clinical Medicine, University of Minnesota.

The serum test for determining the presence of typhoid fever has received a great deal of attention during the past few months.

It is not necessary for me to review the literature on this subject. Suffice it to say that to Widal belongs the credit of its introduction. At the same time Dr. Wyatt Johnston of Montreal, by his practical suggestions, has done much to popularize this test with the medical profession.

The action of the Quebec and of the New York City boards of health in supplying laboratory facilities for the examination of the

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*Read before the Minnesota Academy of Medicine, Jan. 6, 1897.

[3]Physicians who should know state that there are probably fifty lepers in Minnesota.

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blood of suspected typhoid fever cases is to be commended, and their example should be followed by other boards of health throughout the country.

I have to report to-night the results from sixty-seven examinations of blood specimens which have been made during the past two months at the bacteriological laboratory of the state board of health of Minnesota by Prof. F. F. Wesbrook and the assistant bacteriologist, Dr. L. B. Wilson, demonstrating the importance of this test in the diagnosis of typhoid fever. (See Table p. 281.)

Case I.—With this case were symptoms which closely resembled those of typhoid fever. The clinical diagnosis was made accordingly. The serum test was used, however, and the absence of the characteristic reaction from this test threw doubt upon the clinical diagnosis. More careful inquiry into the history of the case developed the fact that a few days previous to the appearance of the typhoid symptoms the patient had had his nose cauterized. The diagnosis was now changed to that of sepsis, and this was demonstrated by the subsequent history of the case to be the correct diagnosis.

Case V.—A specimen of blood was sent to the bacteriological laboratory for examination as an aid to diagnosis. The absence of the serum reaction made the existence of typhoid fever doubtful. No full history could be obtained of this case, but the statement was made that the later symptoms did not bear out the first impression as to the presence of typhoid fever. Thus the laboratory diagnosis strengthened the clinical diagnosis.

Case XXI.—The clinical diagnosis in this case was typhoid fever. The disease was mild in character and of short duration. The attending physician classed it among the cases of aborted or cured typhoid fever, and emphasized his ability to treat such cases successfully by remarking that he had had four such cases of typhoid fever during the fall. The history of this case, briefly, is as follows: At the outset there were symptoms closely resembling those of the early stage of typhoid fever—a coated tongue, pain, abdominal tenderness, an elevation of temperature, etc.,—but these symptoms quickly subsided. After but a few days' illness the patient was placed in a hospital. During her stay of one week in the hospital her temperature was normal. A specimen of blood examined gave no serum reaction. The diagnosis of typhoid fever was undoubtedly wrong.

Case XXII.—Here, again, is a case that might be classed with aborted or cured typhoid fever. Unfortunately, however, for any such position, repeated serum tests gave no reaction. The typhoid symptoms quickly subsided, the temperature became normal, and

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Case Number.	Laboratory Exam. No.	Day of the Disease.	Serum Reaction.	Clinical Diagnosis.	Remarks.
I.....	1	8	No.	Sepsis.....	
II.....	2	.....	Yes.	Typhoid fever.	
III.....	3	.....	Yes.	Typhoid fever.....	
	23	.....	Yes.		
IV.....	4	3	Yes.	Typhoid fever.....	Reaction very marked and rapid.
V.....	5	3	No.	?	Not typhoid fever.
VI.....	6	42	Yes.	Typhoid fever.....	
VII.....	7	25	Yes.	Typhoid fever.....	
	64	24	Yes.		
VIII.....	8	42	Yes.	Typhoid fever.....	
IX.....	9	20	Yes.	Typhoid fever.....	
X.....	10	25	Yes.	Typhoid fever.....	
XI.....	11	2	No.	Typhoid fever.....	
	13	4	No.		
	22	8	Yes.		
XII.....	12	42	Yes.	Typhoid fever.....	
XIII.....	18	.....	No.	Typhoid fever.....	Poor technique in collecting blood serum.
XIV.....	14	.....	Yes.	Typhoid fever.....	
XV.....	15	.....	Yes.	Typhoid fever.....	
XVI.....	16	.....	No.	Scarlet fever.....	Poor technique in collecting blood serum.
XVII.....	17	.....	No.	Typhoid fever.....	Poor technique in collecting blood serum.
XVIII.....	19	.....	No.	Typhoid fever.....	
XIX.....	20	.....	No.	Pneumonia.....	
XX.....	21	4	Yes.	Typhoid fever.	
	26	10	Yes.		
	32	.....	Yes.		
	37	26	Yes.		
	51	29	Yes.		
	53	.....	Yes.		
	57	28	Yes.		
XXI.....	28	10	No.	Typhoid fever.....	A typhoid without temperature.
XXII.....	24	5	No.	?	Not typhoid fever.
	30	6	No.		
	34	8	No.		
XXIII.....	25	.....	No.	Rheumatism.....	
XXIV.....	27	.....	No.	Pneumonia.....	
XXV.....	29	.....	Yes.	Typhoid fever.....	
XXVI.....	31	.....	No.		High temperature some weeks after resection of hip.
XXVII.....	33	.....	No.	Pyosalpinx ?.....	
XXVIII.....	35	.....	No.	Tuberculosis.....	
XXIX.....	36	.....	No.	?	No clinical history.
XXX.....	38	.....	No.	?	Not typhoid fever.
XXXI.....	39	.....	No.	Perinephritic abscess.....	
XXXII.....	40	26	Yes.	Typhoid fever.....	
XXXIII.....	41	24	Yes.	Typhoid fever.....	
XXXIV.....	42	79	Yes.	Typhoid fever.....	
XXXV.....	43	17	Yes.	Typhoid fever.....	
XXXVI.....	44	21	No.	Scarlet fever.....	
XXXVII.....	45	14	Yes.	Typhoid fever.....	
XXXVIII.....	46	7	No.	?	Not typhoid fever.
XXXIX.....	47	10	Yes.	Typhoid fever.....	
	62	43	Yes.		
XL.....	48	60	No.	Malaria.....	
XLI.....	49	12	Yes.	Typhoid fever.....	
XLII.....	50	7	Yes.	Typhoid fever.....	
XLIII.....	52	.....	No.		Surgical case.
XLIV.....	54	3	No.		
	56	12	No.		Absent after three days.
	60	16	Yes.	Typhoid fever.....	Well-marked reaction.
	63	27	Yes.		Reaction not so marked as in No. 60.
	67	31	Yes.		
XLV.....	55	6	No.	Pneumonia.....	
XLVI.....	58	12	No.		Absent after three days.
	59	15	Yes.	Typhoid fever.....	Well marked.
	61	24	Yes.		Not so marked as in No. 59.
	66	29	Yes.		
XLVII.....	65	102	Yes.	Typhoid fever.....	

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the patient made a rapid recovery. The diagnosis of typhoid fever was promptly abandoned by her attending physician.

Case XXXVIII.—When first seen, this patient had a temperature of 103 degrees Fahrenheit, and other symptoms of typhoid fever. The serum test gave no reaction, however, and the subsequent clinical history did not favor the diagnosis of typhoid fever.

These four cases (V., XXI, XXII., XXXVIII.), with the histories belonging to each case, would certainly point to some form of intestinal infection. At the same time they emphasize the importance of being guarded in making a diagnosis of typhoid fever. They would also suggest at least the probability that many of the so-called cases of aborted typhoid were rather cases of mistaken diagnosis.

Case XL.—This patient, a child of about six years, was seen at apparently the outset of the disease. The clinical diagnosis was made early, for a younger child in the same family had been ill for about six weeks with typhoid fever, and this patient was thus brought early under the observation of her physician. Blood serum was secured on the second, fourth, and eighth days of her illness. The first two specimens gave no serum reaction. The third specimen gave a marked reaction. It was unfortunate that no serum was obtained between the fourth and eighth days, for we might then have been able to determine the exact day of the appearance of the reaction in this individual case.

Case XX.—A specimen of blood was taken from this young man on apparently the fourth day of the disease. The reaction to the serum test was marked, and continued to be so, so long as the patient was under observation (six weeks). An advantage of the serum test in confirming the clinical diagnosis was demonstrated in this case, for, with the reaction reported as present, the attending physician had the patient promptly removed from the country to the city, where he could have the conveniences of a hospital. While this was a very mild case, clinically considered, the serum reaction was always well marked. I hope to be able to keep this patient under observation until the disappearance of all serum reaction.

Case XLII.—This was a child, aged six years, in whom the most prominent symptom at the time the first blood specimen was secured—the sixth day of the disease—was marked pain over the right tibia. There were other symptoms present, however, suggestive of typhoid fever. Examination of the blood gave the serum reaction. The subsequent clinical history bore out the diagnosis, as made on the serum reaction, of typhoid fever.

Case XLV.—The serum test was made use of on the sixth day of the disease. There was no reaction. The clinical diagnosis was

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pneumonia, and this was rendered more probable by the presence of masses of diplococci in the sputum.

Cases XVII., XXVI., XXX., XXXI., XL.—In all these cases the probable diagnosis, founded on the clinical history, was not that of typhoid fever. The serum test in each case was negative, thus supporting the clinical diagnosis. In some of these cases at the time the serum test was used the possibility of typhoid fever had not been entirely excluded, but the subsequent history bore out the negative result of the serum test.

Cases XIX., XXIII., XXIV., XXVII., XXVIII., XXXVI., XLIII.—In none of these cases had the diagnosis of typhoid fever been made from the clinical history. In fact, they were all diagnosticated *not* typhoid fever. There was a high temperature in each case, however, and this was used as the basis for testing the serum reaction. The absence of the reaction in every case strengthened its diagnostic importance for typhoid fever.

Cases XIII., XVI., XVII.—These cases have no value in determining the importance of the serum test for typhoid fever. The method used in securing the serum was faulty (for this I am responsible). They were undoubtedly cases of typhoid fever, well advanced, and should have given the reaction under proper conditions.

Case XXIX.—This case also has no value in determining the importance of the serum test. The blood specimen was sent to the laboratory from the hospital authorities with initials of the patient only. The hospital authorities cannot trace the case from the initials, and the clinical diagnosis is unknown. The presumption that it was not a case of typhoid fever is strong, for the specimen was sent from the source where I had secured a number of my test cases—cases with high temperatures, but without the clinical history of typhoid fever.

Cases XLIV. and XLVI.—The chief interest of this paper hinges on these two cases: Two physicians who were close friends, both professionally and socially. While they were not living together, they were living under very similar conditions, being thrown together a great deal in their social life. They were taken ill about the same time, and during their illness were in the same house, for Case XLIV., after having been confined at home three or four days, learning that the subject of Case XLVI. was also sick, invited him to his house, in order that they might console each other. These patients were seen by Dr. Talbot Jones of St. Paul, December 11th; at least the eighth and fifth days respectively of sufficient illness to confine them to the house. XLIV. at this time presented certain typhoid symptoms. Not so with XLVI.

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I first saw these patients December 12th. A specimen of blood was at this date taken from XLIV., in order to take advantage of the serum test as a means of establishing the diagnosis of typhoid fever. The result of the test was negative. Having considerable confidence in the serum test, from the laboratory results that had been secured with other cases previously examind, I felt no hesitancy in pronouncing this *not* to be typhoid fever; for this was at least the ninth day of the disease, and we can reasonably expect the reaction to be present on or soon after the fourth day of the disease. The clinical symptoms of typhoid fever still continuing in Case XLIV., another specimen of blood was secured for examination December 17th. The reaction was still negative.

Up to December 16th it had seemed as though the patients in Cases XLIV. and XLVI. were not suffering from the same disease, although they had many symptoms in common. At this date the characteristics common to the two cases were sufficiently pronounced to call forth an opinion from two physicians favoring their common nature, although both physicians at this time gave an opinion against the diagnosis of typhoid fever Their opinion was based upon the atypical symptoms of XLVI. and the absence of the serum reaction in Case XLIV. No blood specimen had been examined from XLVI. at this time. The opinion that the disease in these two cases was one and the same was supported with but one dissenting voice at a consultation, held December 18th, between Dr. Boeckmann, Dr. Renz, and Dr. Talbot Jones of St. Paul, and myself. Not only so, but the clinical symptoms in Case XLIV. being so decidedly those of typhoid fever, there seemed to be but one possible diagnosis for both cases, viz., typhoid fever; and this in spite of the absence of the serum reaction in Case XLIV. and of typical typhoid symptoms in Case XLVI. But here, again, there was one dissenting voice among the consultants, who still held the opinion that Case XLVI. was not one of typhoid fever, his opinion being based upon the clinical history.

At the request of Dr. Boeckmann, I secured for the first time, December 18th, a specimen of blood from XLVI., in order to submit it to the serum test. The reaction was negative. The diagnosis of typhoid fever was still held, however.

On December 20th specimens of blood were secured from both XLIV. and XLVI., and on examination both specimens for the first time gave a positive reaction with the serum test for typhoid fever. This must have been at least the seventeenth day of illness for XLIV. and the fourteenth day for XLVI.

It seems like a strange coincidence that these two cases of typhoid fever (not originating in the same house, yet probably due to

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the same source of infection) should show no response to the serum test until this late date, and this, too, after the continued successful results that we had had with all previous cases examined. It was hard to believe that a test which had failed in but one out of 123 cases of typhoid fever reported by Dr. Wyatt Johnston, and which had not failed in any one of the previous twenty-three cases of undoubted typhoid fever examined at the Minnesota state bacteriological laboratory, should be so tardy in giving a reaction with these two associated cases.

There are lessons to be learned from this experience:

First—Not to ignore the clinical symptoms of typhoid fever because of the absence of the serum reaction.

Second—Not to condemn the serum reaction because it does not always make itself evident early in the history of the case.

Third—The importance of using all diagnostic methods at our command in our attempt to reach positive conclusions.

In all of these cases reported the blood serum was collected by the dry method (I am responsible for this). Criticism as to results may possibly be based by some upon this fact. But Dr. Wyatt Johnston has shown (*British Medical Journal*, Dec. 5, 1896, p. 1629) that the dry method compares very favorably in accuracy with the use of fresh serum in the diagnostic application of this test. In fact, he states that "when a negative result was obtained by the dry method the result by the fluid serum was also negative, and where on reëxamination the positive result was obtained with the fluid serum, without exception the duplicate sample of dried blood also gave a positive result."[1]

Of the forty-seven cases which I have reported (excluding the four cases of poor technique or imperfect history) the clinical diagnosis of typhoid fever was verified in every case by the serum test, except in Case XI. In this one case the clinical diagnosis of typhoid fever should have been withdrawn, for it undoubtedly was wrong.

In those cases where the clinical diagnosis had been abandoned, repeated examinations of the serum failed to give the typhoid reaction.

It is worthy of note that the blood specimens were submitted to the laboratory for investigation without any clinical history, and the laboratory diagnosis was based solely upon the serum reaction.

In closing this paper, I wish to express my appreciation of the hearty coöperation shown in this work by Professor Wesbrook and Dr. Wilson. Without them it would have been difficult, or even impossible, for me to carry on this study.

[1] In a circular issued Jan. 7, 1897, Dr. Wyatt Johnston states that "solutions of the entire blood react more intensely to the test than solutions of blood serum alone," the reverse of what we had anticipated.

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TYPHOID INFECTION.[1]

BY HENRY M. BRACKEN, M. D.,

Professor of Materia Medica, Therapeutics and Clinical Medicine, University of Minnesota; Secretary and Executive Officer of the Minnesota State Board of Health.

It has generally been admitted, I think, that typhoid infection means typhoid fever, with its classical duration and convalescence, or death; that typhoid fever could not be aborted; that patients who have the early symptoms of typhoid fever, and, after a few days only of illness, recover, cannot possibly have had typhoid fever. If you ask a conscientious physician to name the illness that such a patient has had, a shrug of the shoulders and possibly the statement, "Only a simple fever," will be the reply given.

It seems to me there is a possibility of error in all this. There have been over 1,800 examinations of blood, after the Widal-Johnson method, made at the laboratory of the Minnesota state board of health during the past ten months. While the serum-diagnosis has quite uniformly been borne out by the clinical diagnosis, there have been cases in which the blood gave very marked reaction with the first appearance of typhoid symptoms, but in which the clinical symptoms quickly subsided, and the patient made apparently a prompt recovery. There have been cases in which the serum-reaction has persisted for a time after such a patient has apparently recovered from this hybrid form of fever. Such cases are likely to be stumbling blocks to the clinical physician. They are disposed to make the doubting man a skeptic in his ideas relating to this serum-test. Far be it from my intention to make positive statements relative to this class of patients. There is, however, an opportunity to ask ourselves seriously how we can explain these facts. May I suggest as an explanation the possibility of *typhoid infection without the classical typhoid fever?*

We admit that certain individuals may have a natural immunity against typhoid fever; that other individuals may have an acquired immunity, the result of the disease at some time in the past; that still others may become immune in a manner quite similar to that by which we produce artificial immunity, viz., by constant exposure to infection, the infection being in too small a quantity, however, to produce the specific disease of that infection. Thus the individual

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[1]Read at the meeting of the American Public Health Association, Oct. 28, 1897, Philadelphia.

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who is constantly using water contaminated with the germs of typhoid fever, may escape the disease, while a newcomer who uses the same water, quickly succumbs. Still further, we know that an individual who is constantly using contaminated water may at one time be able to resist infection and at some later period become infected, although he has used the contaminated water in the same quantity and manner in both cases.

In the light of the foregoing facts, may it not be possible for an individual to receive such a degree of infection as to produce the early symptoms of typhoid fever, and for the system to develop an antitoxine so promptly, and in such amount, as to cut short the process of the disease, and thus prevent the completion of classical typhoid fever? It would seem that an unusually marked reaction to the serum-test, with the early appearance of such symptoms, and the prompt subsidence of such symptoms followed by a return to health, would bear out such a proposition. It would seem, with an early and marked Widal reaction, as though the conditions of the blood, producing such a reaction, might have some bearing on the degree of resistance of the individual to infection, and that this would suggest the possibility of this reaction being one of immunity, rather than of infection. This, I know, is contrary to the teaching of Widal and others, but it is safe to say, I am sure, that the concensus of opinion is yet unsettled as to the relation of this serum reaction to immunity.

Let us give this possibility a little attention. It used to be stated that children did not have typhoid fever. This we no longer believe. It is a commonly accepted fact, I think, that the mortality from typhoid fever is lower with children than with adults. Various explanations have been given as bearing upon this fact. Let us see if there is anything to be learned from a comparison in these cases, of the serum-reaction and the mortality. The laboratory records show that the serum-reaction, as a rule, appeared earlier with this class of cases than with older patients, half of the second and third day positives being among children, although they numbered only one-seventh of the total number of positive reactions. It may be interesting to note the ages of children that responded to this test. I will therefore quote a table presented from our laboratory in a paper read at the Montreal meeting of the British Medical Association, September, 1897.[2] Of seventy-eight cases in children responding to the serum reaction, the distribution was as follows:

[2]Preliminary Report on the Serum Diagnosis of Typhoid Fever. By Drs. Wilson and Wesbrook.

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4 cases at 13 years.
7 cases at 12 years.
6 cases at 11 years.
4 cases at 10 years.
9 cases at 9 years.
8 cases at 8 years.
8 cases at 7 years.
9 cases at 6 years.
11 cases at 5 years.
4 cases at 4 years.
3 cases at 3 years.
4 cases at 2 years.
1 case at 2 days.

If it is true that the serum reaction can be obtained earlier, as shown by our laboratory records, with children than with adults; that the reaction is marked; and that the mortality from typhoid fever is lower with children than with adults; then it would seem as though these facts taken together might have some bearing in marking the reaction as one of immunity, rather than of infection.

Quite a number of cases of adults are on record, in which there was a marked serum reaction present early in the disease, and that following this there was a rapid subsidence of the fever and other typhoid symptoms and a prompt return to health. It is quite impossible to tabulate these cases, for, as a rule, the laboratory has no means of following up their histories. Here is an illustration of such a case:

A lady with an unusually robust constitution was taken ill. The clinical symptoms pointed strongly toward possible typhoid fever. A quantity of her blood, sufficient for examination, was sent to the laboratory. In due time this gave a marked serum-action. This was apparently on the third day of the disease. This patient was away from home. Her husband was informed of her condition. He hastened to her, expecting to find her very ill, judging from the information furnished him by the physician in charge as to her condition on the previous day. Imagine his surprise on finding her but slightly indisposed. There were four examinations made of this patient's blood, extending over a period of eleven days. The examinations were made on what were supposed to be the third, fifth, seventh, and eleventh days of the disease. The reaction was marked in each case. The temperature was said to be normal between the fifth and eleventh days. On these two days, the temperature, both morning and evening, was ninety-nine degrees.

The skeptical physician might consider this a case of faulty technic on the part of the examiner, but this is not probable, for the experience in this laboratory during the past year has been such as to enable the bacteriologists to become quite familiar with this test. The most carefully repeated observations, with accurate dilutions varying from 1-25 to 1-500 were used in this case. It would seem as if this was a case of typhoid infection without the classical record of a typhoid fever patient; that there was sufficient resistance developed, and that promptly, to cut short the progress of the disease. In fact, it was a case of typhoid fever aborted by nature. It is unnecessary to cite other cases of this type. You are probably famil-

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iar with such, through their clinical history, if not through the serum reaction.

One of the first specimens of blood examined in our laboratory gave a marked serum reaction on apparently the fourth day of the existence of typhoid fever. Examinations of the blood of this patient were made on the 4th, 10th, 17th, 26th, 28th, 65th, 87th, 103d, and 110th days from the beginning of the disease. The reaction was marked from the first six examinations. The one made on the 87th day was faint. Those made on the 103d and 110th days were both negative. The disease lasted the usual time for a typical typhoid fever case. The patient had, at times, a temperature of 104 degrees, but as a rule, it was not above 102 degrees, and this without the use of any antipyretic measures. At no time did the patient suffer much discomfort. Clinically you are all familiar with such cases.

It would seem to me that both of these cases point to the possibility of this reaction being one of immunity. In the first case, the progress of the disease was cut short; in the second case, the intensity of the disease was controlled. Let us now study two cases taken from the reverse of the foregoing, but pointing also, it seems to me, toward the fact that this reaction may be one of immunity rather than of infection. Two gentlemen friends were taken ill about the same time, and probably from the same source of infection, which could not be definitely settled upon. Conjecture pointed to infection from the eating of raw oysters. The early symptoms in both cases were intense and uncontrollable febrile temperatures and persistent headache. Typhoid symptoms were not marked, although some of the symptoms suggested the possibility of typhoid fever. However, the general character of the disease in each case, together with the absence of the Widal reaction, caused great confusion in arriving at a diagnosis. These patients were seen by four capable medical men. Of these four physicians, the one who was not yet familiar with the serum reaction was the first to insist upon the diagnosis of typhoid fever. Another physician, who had some confidence in the serum reaction, found it hard to admit that it must be typhoid fever with the reaction absent, but finally yielded. A third physician was willing to admit that one of the patients had typhoid fever, but still insisted that the other patient was not suffering from this disease; while the fourth physician insisted that the absence of the serum reaction was enough to exclude the diagnosis of typhoid fever in both cases. All admitted the existence of typhoid fever in both cases, when, on presumably the 13th day in one case, and the 17th day in the other, the serum reaction was pres-

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ent. Even at these late dates the reaction was not marked, and never was well marked during the continuance of the disease, in either case. Both of these cases were decidedly ill. Both had albuminuria more or less marked at some period of their illness. One had active delirium, relapse, and finally a typical convalescence. The other, while having less marked symptoms throughout the disease, made a slow recovery. These two cases seem to illustrate the *absence* of any attempt, on the part of nature, to establish immunity, as shown by the long delayed appearance of response to the serum reaction, by the temporary response only to this reaction, and by the whole course of the disease. These are in strong contrast with the case at first referred to in which the typhoid infection was undoubtedly present without the classical course of typhoid fever following, but they seem to be no less important in our effort to try to reach a conclusion as to the reasons for typhoid infection without typical typhoid fever.

SUGGESTIONS DRAWN FROM THE SERUM REACTION IN TYPHOID FEVER.[1]

BY H. M. BRACKEN, M. D.,

Professor of Materia Medica and Therapeutics, University of Minnesota; Secretary and Executive Officer of the Minnesota State Board of Health

The serum reaction as a diagnostic test of typhoid fever has been prominently before the medical profession for more than a year. The question naturally suggests itself: Of what benefit has it been to the medical profession, and what is to be learned from its use? Investigation points to the following conclusions:

First—It is probably the most reliable of all single tests or symptoms that we have at our command for use in the diagnosis of typhoid fever. This statement is certainly borne out by the many examinations reported from the bacteriologic laboratories throughout this and foreign countries. The bacteriologic laboratory of the Minnesota state board of health had examined 1,845 specimens of blood taken from 1,019 cases of suspected typhoid fever up to Oct. 21, 1897.[2] Of these 1,019 cases, 687 were instances of undoubted ty-

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[1]Read before the Minnesota Academy of Medicine, Dec. 1, 1897.

[2]Wesbrook & Wilson: "The Serum-diagnosis of Typhoid Fever," American Public Health Association, October, 1897.

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phoid fever. No definite report can be made upon the remaining 332 cases because of incomplete clinical data. The laboratory must not be held responsible for this imperfect record, for upon receipt of a specimen of blood, a special form is sent out to the attending physician, upon which to record the clinical data of each case. But 314 of these forms were filled out and returned.

Second—The reaction does not always appear early, and its absence cannot exclude the possibility of typhoid fever. If the clinical symptoms are well marked and the serum reaction is absent, the diagnosis should be made upon the clinical findings, and repeated examinations of the blood should be continued. The serum reaction is pretty sure to be present at some period during the progress of the disease if it is typhoid fever, and the clinical diagnosis can thus be confirmed or disproved. This is illustrated by the following tables:[3]

TABLE A.

The reaction present on or before the seventh day.

1st day	3 cases.
2d day	26 cases.
3d day	29 cases.
4th day	53 cases.
5th day	38 cases.
6th day	44 cases.
7th day	70 cases.

TABLE B.

The reaction appearing after the seventh day.

Absent in	7 cases	as late as the	8th day.
Absent in	5 cases	as late as the	9th day.
Absent in	5 cases	as late as the	10th day.
Absent in	8 cases	as late as the	12th day.
Absent in	3 cases	as late as the	14th day.
Absent in	1 case	as late as the	22d day.
Absent in	1 case	as late as the	36th day.
Absent in	1 case	as late as the	40th day.

Third—The serum reaction appears, as a rule, earlier in children than in adults. This is an advantage, for the question of differentiating typhoid fever from some other disease is often more difficult, and at the same time more necessary, with children than with adults. In 78 specimens taken from children and giving the serum reaction, the distribution, by years, was as follows:[4]

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[3]Wesbrook & Wilson's Report to A. P. H. A., Philadelphia, October, 1897.
[4]Wesbrook & Wilson's Report to British Medical Association, Montreal, Sept. 2, 1897.

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4 cases at 13 years.	9 cases at 6 years.
7 cases at 12 years.	11 cases at 5 years.
6 cases at 11 years.	4 cases at 4 years.
4 cases at 10 years.	3 cases at 3 years.
9 cases at 9 years.	4 cases at 2 years.
8 cases at 8 years.	1 case at 2 days.
8 cases at 7 years.	

It is interesting to note the youngest case on record at the laboratory of the Minnesota state board of health, as giving the serum reaction, viz., the child two days old, recorded in the last table. The mother of this child, when eight months pregnant, showed marked clinical symptoms of typhoid, although her blood failed to react on the second day and again on the fourth day. The child was born on the third day of the mother's illness. Two days later the infant's blood gave a marked reaction (a specimen of blood taken from the mother at the same time was unfortunately lost in transit). On the seventh and fourteenth days of life, the babe's blood still reacted, and it continued to react for at least two months after its birth. The mother's blood was examined on the sixth, thirteenth and twentieth days of her illness, and gave the serum reaction. The child showed no clinical symptoms of typhoid fever, and was apparently in perfect health. It is still living, and is now about four months old. This is an interesting case, as demonstrating the passage of the cause of the reaction from the mother to the fetus through the placental barrier.[5] Still further interest is attached to these cases in the fact that the onset of the typhoid was very sudden with the mother, beginning as it did with nausea, vomiting and abdominal pains three days before the child was born.

Fourth—It is generally admitted that the serum reaction may sometimes, though rarely, be present with other diseases than typhoid fever. There is no explanation to offer for this except the possibility of typhoid infection that is not recognized clinically. This is not an unreasonable supposition, as demonstrated by the case of the child just referred to.

Fifth—With the serum reaction present and all possibilities of a previous typhoid fever excluded, it behooves us to be extremely guarded in giving a diagnosis against typhoid infection simply because the clinical symptoms are not well marked. You will remem-

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[5]At the time this paper was written it seemed as though the only possible source of infection for the child must have been through the placental barrier. Later, however, I was informed that the child had been put to the mother's breast previous to the time when its first blood-specimen was taken. This throws doubt upon the method of infection for the child.

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ber that at the last meeting of this academy cases were reported that give force to this warning. Thus:

Case A.—An operation had been performed for appendicitis. The appendix was found diseased and was removed. All was going well, when six weeks after the operation abdominal pain and elevation of temperature suggested the necessity of opening up the wound. This was done. The point of former operation was found to be in good condition. The patient died shortly after this second operation. Post mortem examination showed the existence of typhoid fever, the possibility of which had not previously been considered.

Case B.—There had previously been attacks of pain that suggested the existence of appendicitis. The pain present at the time this patient came under observation led to the diagnosis of appendicitis. The blood was examined, but showed no increased leukocytosis. The patient was operated upon for appendicitis, and while the appendix was found to be not entirely normal, there was no pus present and not sufficient disturbance to account for the symptoms. It was stated that there was a mild catarrhal appendicitis, with a slight hemorrhage. The operation was performed on the fifth day of the illness. The serum test for typhoid fever was not made before the operation. The possibility of typhoid fever was discussed before the operation, but excluded on the clinical symptoms. Two days after the operation the patient showed the typical typhoid rash and other clinical symptoms of typhoid fever. A specimen of blood taken the day after operation gave the serum reaction.

Case C.—A woman shortly after confinement developed a temperature. Her physician thought this due to sepsis, although the temperature was the only symptom present pointing to that condition. Treatment was governed by this supposition. The temperature continued, and an examination of the blood gave the serum reaction of typhoid fever. The existence of typhoid fever from this time on was unquestioned.

Case D.—The diagnosis of appendicitis had been made. The blood was examined and gave the serum reaction of typhoid infection. The attending physician and his associates did not change the diagnosis because of this fact, but rather took the opportunity to dwell upon the unreliability of the serum reaction. The patient was operated upon for appendicitis. The appendix was thus found not to be the offending organ. The patient died. A post mortem examination was made, and it was stated from this that there was no evidence of typhoid fever, thus presumably confirming the criticism upon the serum reaction. Not so, however, for with the post mortem no attempt beyond a macroscopic examination was made,

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to establish the existence or non-existence of typhoid infection. This, as I will show further on, is not sufficient evidence with our present knowledge of this condition.

Up to the time of the reporting of these cases, I had begun to wonder if there was a greater possibility of having the serum reaction with appendicitis than with other non-typhoid diseases. Now I am inclined to wonder if the tendency to diagnosticate pain in the abdominal region, as due to appendicitis, may not lead one into the error of overlooking a typhoid fever, even with the serum reaction present to warn against a too hasty diagnosis in favor of some other diseased condition.

Sixth—All typhoid infections do not run the typical course of typhoid fever. This position was maintained in a paper which I presented at the Philadelphia meeting of the American Public Health Association, in October, 1897, and I think it is quite generally recognized at the present time. There has been a class of cases which, in the past, were diagnosticated early as typhoid fever. This diagnosis has later been abandoned by one class of physicians because of the disappearance of the typhoid symptoms, such physicians maintaining that the failure on the part of the patient to continue through the classic course of the disease was sufficient evidence to condemn the first diagnosis. On the other hand, a group of physicians have used this class of cases to prove the possibility of aborting typhoid fever. The serum reaction is in a fair way to demonstrate that neither of these views is correct. By showing the reaction in these cases it establishes the fact of typhoid infection, while the occurrence of prompt recovery, without any special drug treatment, leads to the belief that nature may be more successful in aborting a typhoid fever than any physician can be. It is noticeable that many of these cases give an early and a marked serum reaction, while other cases, with the classic course of typhoid fever, are slow in giving the reaction, and even when it is present it is not at all well marked or constant.

Seventh—The relationship of the serum reaction to typhoid infection. Widal and others early claimed that this reaction was one of infection, but the general trend of opinion, at present, seems to be that it is one of immunity. The group of cases already referred to as typhoid fever, aborted by nature, seems to bear out this view. The record of typhoid fever and the serum reaction in children gives it further support. This view may receive additional evidence in its favor, even from quite marked cases of typhoid fever in which the serum reaction is present early, constantly, and to a marked degree, throughout the whole course of the disease; in which the tempera-

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ture is high, and yet in which the patient seems little disturbed by these conditions, while the absence of complications is marked.

In the light of the foregoing facts, it would seem as though the individual might receive such a degree of infection as to produce symptoms of typhoid fever, and that the system might develop an antitoxine so promptly and in such amount as to cut short the regular progress of the disease, or at least to greatly modify its severity.

Finally, I wish to draw your attention to the fact that neither clinical evidence nor macroscopic appearances at a post mortem examination are sufficient to disprove the possibility of typhoid infection, and those who are disposed to criticise the test must take more care in making post mortems if they wish to establish the unreliability of this reaction. Welch[6] states that "infections with the typhoid bacillus occur without any characteristic anatomic lesions. There may be entire absence of ulcers or other lesions of the intestine." In support of this statement, he cites a case at the John Hopkins Hospital which gave a positive serum reaction. There was no previous history of typhoid fever. The post mortem examination showed no intestinal lesions, and yet Dr. Flexner was able to obtain cultures of the typical bacillus of typhoid fever from the gall bladder. Welch also quotes a case reported by Pick, which gave a marked serum reaction, "in which at the autopsy no typhoid intestinal lesions and no swelling of the spleen were found, but bacteriologic examination showed the presence of typhoid bacilli; not, however, in the spleen." Guinon and Meunier's cases are also quoted in the same article as instructive and bearing upon this point. Thus: "During life the symptoms were those of acute miliary tuberculosis and typhoid fever combined. Serum reaction was positive. At autopsy the lesions appeared to be only those of acute miliary tuberculosis, small ulcers in the intestine being typically tubercular in aspect. Typhoid bacilli, however, were cultivated from the spleen and other parts." Continuing, Welch says: "We are justified in the light of such cases as these in demanding that thorough bacteriologic examinations be made before cases, which have given during life the characteristic serum reaction, but which do not present at autopsy the anatomic lesions of typhoid fever, be recorded as free from infection with the typhoid bacillus." Of course, the possibility of a previous attack of typhoid fever, even though several years may have elapsed, must also be excluded, before the serum reaction can be condemned.

It is hardly necessary at this late date to insist that the true reaction must not be confused with the false reactions occasionally reported by excellent observers.

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[6]Journal Am. Med. Assn., Aug. 14, 1897, p. 308.

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PRELIMINARY REPORT ON THE SERUM DIAGNOSIS OF TYPHOID FEVER IN AN EPIDEMIC DURING WHICH TYPHOID BACILLUS WAS ISOLATED FROM THE PUBLIC WATER SUPPLY.[1]

BY LOUIS B. WILSON, M. D., AND F. F. WESBROOK, M. D.

(From the Bacteriological Laboratory of the Minnesota State Board of Health.)

NATURE OF INQUIRY.

The application of the serum test for the diagnosis of typhoid fever was begun in the bacteriological laboratory of the Minnesota State Board of Health, Nov. 1, 1896, but up to Feb. 1, 1897, only about fifty cases had been examined. At this time, however, there commenced an epidemic of the disease in one of the larger cities of the state, and an opportunity to study the test under such conditions has been afforded.

Clinical histories pointed to the public water supply as the source of infection, and on March 18, 1897, the *bacillus typhi abdominalis* was isolated therefrom. It may be mentioned that the testing of doubtful single Elsner plate colonies with known typhoid blood proved of very material aid in this examination. Soon after it was obtained in pure culture the bacillus, grown twenty-four hours in broth, was found to kill 250-g. guinea pigs in twenty-four hours or less in c. cm. doses.

After some months of careful proving by the recognized laboratory methods the culture was put into use for testing suspected blood specimens, and, when compared with the stock laboratory cultures, showed itself to be slightly more sensitive than they. It is thought, however, that this extra relative sensitiveness is slowly being lost. The property seems to have been only an incident at best, and not sufficient to mark the culture as a variety, since it was manifest equally well with specimens from patients remote from and those immediately within the area of the epidemic.

From the first the dried blood method of Wyatt Johnston has been followed. Specimens, collected on glass or non-bibulous paper, when received at the laboratory, are moistened with distilled water,—varying dilutions of one in fifteen to one in fifty have been

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[1]Paper read in the Section of Pathology and Bacteriology at the annual meeting of the British Medical Association held in Montreal, September, 1897.

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used,—and hanging drop preparations therefrom, inoculated either directly from the surface of twenty-four-hour moist glycerine agar cultures, or from two-hour broth emulsions of such cultures. Controls have been used with every lot of specimens made up. All are examined within half an hour after having been prepared, and, again on the following morning, sixteen to eighteen hours later, being kept in the meantime in the dark, at room temperature. This second examination of specimens serves as a valuable check on the previous day's findings, and frequently indicates a positive reaction very early in the disease, the result being substantiated by immediate positive reactions later in the history of the case.

RESULTS.

Up to Aug. 20, 1897, 1,400 specimens have been examined, taken from 817 cases of suspected typhoid and from seventy-six patients suffering from other diseases. In the non-typhoid cases the results were as follows:

REPORTED NEGATIVELY.

	Cases.		Cases.
Appendicitis	4	Lumbar abscess	1
Bronchitis	2	Malaria	5
Cystitis	1	Mastoid disease	1
Diphtheria	1	Melancholia	1
Entero-colitis	5	Pleurisy	1
Erysipelas	1	Pneumonia	8
Gonorrhœa	1	Rheumatism	2
Indigestion (acute)	5	Tonsilitis	5
Influenza	12		

One positive and one partial reaction were obtained respectively in two cases clinically diagnosed as influenza. One case of acute mania failed to react, but another case gave two positive reactions. Also one case of puerperal mania gave a positive reaction.

Two positive reactions were obtained in a somewhat doubtful case of pulmonary tuberculosis, and a doubtful one in each of two certain cases of the same. Two marked reactions were obtained in the case of a child (inmate of a hospital), suffering from poliomyelitis, with paralysis of the lower extremities, and having had an irregular temperature for over a year.

In none of the above eight cases could a history of previous typhoid be obtained, neither could it with certainty be excluded in any of them, for these patients were all residents of a city which has had annual epidemics of typhoid fever, due, probably, to contamination of its public water supply, for the last five years.

One case, which had been diagnosed appendicitis, with an opera-

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tion and the removal of an apparently normal appendix, gave a few days later a positive reaction, followed by the ordinary group of typhoid symptoms.

The fifty-five cases of supposed typhoid from without the area of the epidemic gave twenty-eight positive and twenty-seven negative findings, while their clinical histories, so far as they could be obtained, sustained the laboratory reports.

The cases from the localized epidemic were of varying degrees of severity in symptoms, from those so mild as to be almost impossible of clinical recognition, to those ending in death. In all, 762 cases from this source were examined; 210 of these gave negative results, 39 were doubtful (only 5 of these were examined twice, however), and 513, or slightly over sixty-seven per cent, were positive.

A subsequent clinical history of typhoid was present in but nine of the cases reported negatively, and eight of these were examined but once, and that early in the disease. The remaining case, and the only one which should here be considered, was pronounced mild typhoid by an experienced clinician, yet gave negative findings on the eighth, eleventh, sixteenth and twenty-second days of the disease.

Tables showing the day of the disease in which a positive reaction was first obtained are apt to be misleading, owing to the indefinite onset of symptoms, and to the fact that many cases are not examined until late in the disease. The following, however, is given for what it may be worth:

LIST OF THE DAYS OF THE DISEASE ON WHICH A POSITIVE REACTION WAS FIRST OBTAINED.

In 2 cases on the 1st day.	In 28 cases on the 8th day.
In 21 cases on the 2nd day.	In 22 cases on the 9th day.
In 20 cases on the 3rd day.	In 44 cases on the 10th day.
In 43 cases on the 4th day.	In 12 cases on the 11th day.
In 28 cases on the 5th day.	In 20 cases on the 12th day.
In 33 cases on the 6th day.	In 9 cases on the 13th day.
In 60 cases on the 7th day.	In 53 cases on the 14th day.

A more accurate idea of the first appearance of the reaction may be obtained from the following:

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TABLE SHOWNG THE DAYS OF THE DISEASE ON WHICH EXAMINATIONS WERE MADE IN CASES OF SUSPECTED TYPHOID.

Findings.			Findings.		
Negative.	Doubtful.	Positive.	Negative.	Doubtful.	Positive.
1	8	5	7	—	11
—	8	7	7	9	13
—	8	8	7	—	15
—	8	12	—	8, 8	14
8, 44	—	7, 14, 42, 84	2, 8	—	9
8	—	7	8	—	10
2, 8, 42	—	6, 12, 14	8	—	11
2, 8	—	8	8	—	12
2, 8	—	8	8	—	13
4	—	5	4, 8, 13	—	28
—	4	6	9, 21	—	12, 19 20, 25
5	—	7	7, 9	—	19
4, 5	—	8, 12	8, 9	—	24
8, 5	—	8, 10, 21	9	—	26
5	—	8	10	—	14
8, 5	—	10, 12, 21, 28	10	—	16
5	—	10	7, 10	—	17
5	—	10, 14	2, 6, 10	—	18
—	5	9	8, 6, 10	—	21
5	—	11, 21	—	7, 11	16
—	6	9	12	—	13
4	6	10, 18	12	—	14
—	6	10	12	—	14
6	—	10, 14, 35	12	—	15
6	—	11	12	—	15, 24, 29
4, 6	—	13, 21	12	—	16
6	—	14	8, 12	—	16, 27, 32
7	—	8, 20	12	—	28, 42
7	—	9	14	—	15, 16, 20, 28, 24
7	—	10	6, 7, 14	—	16, 20, 24
7	—	10	14	—	21
7	—	10	15, 22	—	25, 28

It will be noted from this table that the reaction was absent or doubtful as late as the—

3rd day in 9 cases.
4th day in 2 cases.
5th day in 9 cases.
6th day in 7 cases.
7th day in 7 cases.
8th day in 7 cases.
9th day in 5 cases.
10th day in 5 cases.
12th day in 8 cases.
14th day in 3 cases.
22nd day in 1 case.

As a proof of how fallacious are conclusions drawn from such compilations of cases in which only one negative examination has been made somewhat later in the disease, followed by positives, one case will be cited. This was of a man with an ordinary run of typhoid, in whose blood the reaction was absent on the ninth day, present on the twelfth, absent on the thirteenth, present on the nineteenth and twentieth, absent on the twenty-first, and present on the twenty-fifth day of the disease. It is believed that no mistake

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was made anywhere in the examinations from this case, and that the disappearance of the reaction on two different occasions was real and not merely apparent. No corresponding variation of the clinical symptoms was observed.

THE REACTION IN CHILDREN.

Seventy-six out of 165 children examined gave positive findings. The reaction, as a rule, appeared earlier with this class of cases than with older patients, half of the second and third-day positives being in this group, though it composed only about one-seventh of the total number of positive cases.

The cases in children were distributed by years as follows:

4 cases at 13 years.	9 cases at 6 years.
7 cases at 12 years.	11 cases at 5 years.
6 cases at 11 years.	4 cases at 4 years.
4 cases at 10 years.	3 cases at 3 years.
9 cases at 9 years.	4 cases at 2 years.
8 cases at 8 years.	1 case at 2 days.
8 cases at 7 years.	

This last case is worthy of a passing remark. The mother, seven months pregnant, showed marked clinical symptoms of typhoid, though her blood failed to react on the fourth day, and again on the sixth day, at which time the child was born. Two days later the infant's blood gave a marked reaction (a specimen from the mother taken at the same time was unfortunately lost in transit). On the seventh and fourteenth days of its life the baby's blood again reacted, as did also the mother's on the thirteenth and twentieth days of her illness. The cases are still under observation.

Among convalescents, in one case the reaction was observed present on the 124th day, and absent on the 154th; in another, present on the 125th, and very faintly marked on the 158th. In a number of other cases still under observation it has been found present for periods varying from ninety to 120 days from the inception of the disease. In a few cases it has disappeared permanently as early as the thirty-fifth and fiftieth days.

The foregoing report is not intended in any sense as a comparison of methods, but as a simple statement of the results obtained by the use of the now well-known dried blood method of Wyatt Johnston.

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THE SERUM DIAGNOSIS OF TYPHOID FEVER FROM THE PUBLIC HEALTH LABORATORY POINT OF VIEW.[1]

BY

F. F. WESBROOK, M. D., Director, and
L. B. WILSON, M. D., Assistant Bacteriologist, Laboratory of the Minnesota State Bacteriological Laboratory, Minnesota State Board of Health.

In October, 1896, the laboratory of the Minnesota state board of health took into consideration the feasibility of adopting this method of diagnosis as routine work, and, during the next four months, examinations[2] were made with the view of determining the most practicable and suitable method for use under conditions such as are obtained in a laboratory which is called upon to make and report upon examinations from all parts of a large state.

The now well known dried blood method of Wyatt Johnston seemed, for the reasons given by him, most suitable for the work, and after a thorough test during these months was, with but a few modifications, adopted, and such examinations became a part of the routine work of the laboratory.

On Aug. 20, 1897, 1,400 specimens of blood had been examined and reported upon to the physicians furnishing them. Some of these examinations, methods employed, and results obtained were presented as a "Preliminary Report on the Serum Diagnosis of Typhoid Fever in an Epidemic During which *B. Typhi abdominalis* was Isolated from the Public Water Supply," to the Section of Pathology and Bacteriology, British Medical Association, at Montreal, Sept. 2, 1897, by Wilson and Wesbrook.

The desirability of a method by which a high degree of accuracy could be obtained without entailing a corresponding amount of complexity either for the physician,—frequently altogether unacquainted with practical bacteriological procedures,—or for the laboratory, was apparent. A method, of which the following is a description, was devised by one of us (Dr. Wilson), and adopted for laboratory use on September 10th, and up to the present time has been found to fill all the requirements which led to its trial, in those specimens so collected and examined (over 300).

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[1]Presented to the American Public Health Association at Philadelphia, October, 1897.

[2]The clinical material for the first experiments was furnished and specimens obtained by Dr. H. M. Bracken, secretary of the Minnesota state board of health, who reported the results of the laboratory examinations in relation to the clinical symptoms, before the Minnesota Academy of Medicine Jan. 6, 1897, published *New York Medical Journal*, April 24, 1897.

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It may be here mentioned that this method, furnishing, as it does, a degree of accuracy not to be obtained by any previously reported which is capable of being utilized in public health diagnostic work, has not served to show the probability of error in those investigations made before its adoption.

DESCRIPTION OF METHOD.

An envelope is furnished to physicians which contains the following named articles:

1. A piece of aluminum wire, No. 19 gauge, 7.5 cm. long, and having a loop 0.3 cm. in diameter bent on one end.
2. A piece of aluminum foil, No. 750 gauge, 5 cm. square.
3. A data blank, as follows:

MINNESOTA STATE BOARD OF HEALTH, BACTERIOLOGICAL LABORATORY.

(University of Minnesota, Minneapolis.)

DATA TO ACCOMPANY SPECIMEN FOR TYPHOID FEVER EXAMINATION.

Date and hour of collection.....
Patient's name.....Address.....
Physician's name.....Address.....
Health officer's name.....Address.....
Has this case been reported upon before?.....If so, give former case No.....
Patient's age.....Sex.....Temperature.....
How long since disease commenced?.....
What is the supposed source of infection?.....
When, if ever before, has patient had typhoid fever?.....
Remarks .....
.....
Physician's diagnosis.....Do you desire telegraphic report?.....

The envelope has printed on it the following:

MINNESOTA STATE BOARD OF HEALTH, BACTERIOLOGICAL LABORATORY.

(University of Minnesota, Minneapolis.)

OUTFIT FOR COLLECTING SPECIMEN OF BLOOD FOR SERUM DIAGNOSIS OF TYPHOID FEVER.

To secure a reliable reaction with dried blood it is necessary that a comparatively large amount be collected in as cleanly a manner as possible. Hence please observe carefully the following directions:

Wash with boiled water the part from which the blood is to be obtained—(the lobe of the ear, end of finger, or toe in infant). Prick deeply the skin with a clean needle or scalpel. Remove four or five loopfuls of blood with the wire loop in outfit, placing each by itself near one edge of the aluminum square enclosed. Make a roll—about 1 cm. in diameter—of the square, turning inward the blood without smearing it. Flatten one end of the roll and turn the edge over to prevent it from opening. *Allow the blood to dry*, then make a tight packet of the roll by flattening and turning over the other end. Fill out

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the data blank *in full*, return it with the foil-packet and wire loop to its envelope; place this in a larger envelope and mail to the laboratory.

When the packets are opened in the laboratory the dried blood readily flakes off from the polished surface of the foil. A portion is removed from the packet with a spatula, 1 mg. is weighed on a fine balance, placed in a small test-tube, and a sufficient amount of distilled water or 0.67 per cent sodium chloride solution for the required dilution is added from a fine graduated pipette.

After shaking, the tube is allowed to stand for thirty minutes, when a hanging drop preparation therefrom is inoculated from a fresh agar slant culture of *B. typhi abdominalis* or from a broth emulsion of the same.

The remainder of the dried blood—there is usually about 5 mg. in a packet—is preserved for experiments with other dilutions than the standard one of 1 in 50.[1]

Thus, if no reaction is obtained at the end of two hours with the standard dilution of 1 in 50, of the first specimen of blood taken during the first few days of the typhoid symptoms, other preparations of the same specimen are made of 1 in 25 or 1 in 10.

The reactions sometimes thus obtained very early in the disease are taken only as suggestive until confirmed by later specimens reacting in higher dilutions.

In making dilutions of the dried blood 1 mg. is estimated equivalent to 4 mg. of freshly drawn blood. This ratio was determined by weighing a number of drops of blood both immediately after drawing and again after drying, when it was found that the loss was 75 per cent to 76 per cent of the original weight.

The advantages of the above-described method of collecting and diluting blood for diagnostic tests in a public health laboratory may be summed up as follows:

1. The outfit is very inexpensive, light and difficult to damage in transportation.

2. The technic required of the clinician is exceedingly simple.

3. When it arrives at the laboratory the blood is not mixed with foreign materials as is frequently the case when it is sent on paper, glass, or in boxes; nor is it putrid, as when collected by unskilled hands in capillary tubes or bulbs.

4. The accuracy of dilution is very great.

The disadvantages are:

1. The dried blood occasionally flies off and is lost when the physician folds the foil.

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[1]This is 1 in 50 fresh blood which is equal to 1 in 200 of dried blood.

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2. Considerable time is required in the laboratory for weighing the blood. This, however, is not so great as would at first thought appear to be the case, since rapidity with accuracy both in using the balance and in judging by the eye the proper amount to place in the pan, is quickly attained in weighing equal amounts of the same substance a number of times at one sitting. (All specimens arriving in the laboratory before noon are made up at that time and reported in the afternoon. Those arriving later are not examined until next day.)

When the specimens have been examined, copies of the following report are sent to the attending physician, to the local health officer, and to the executive officer of the state board of health. One copy is also filed in the laboratory in a numbered and dated envelope, with the original data slip and packet of dried blood, as well as any other information pertaining to the case:

MINNESOTA STATE BOARD OF HEALTH, BACTERIOLOGICAL LABORATORY.

(University of Minnesota, Minneapolis.)

REPORT OF SERUM TEST FOR TYPHOID FEVER.

Case No.....Received.....
Patient's name.....Address.....
Physician's name.....Address.....
Health officer's name.....Address.....
Previous case No.....
Reaction .....
Remarks .....
.....
Reported..... Diagnosis.....
(from above reaction)
....
Director. Assistant Bacteriologist.

With the report on the first specimen from each case there is sent to the attending physician the following:

MINNESOTA STATE BOARD OF HEALTH, BACTERIOLOGICAL LABORATORY.

(University of Minnesota, Minneapolis.)

March 29, 1897.

Special Notice No. 4.
Dr.....
.....

Dear Sir:—

In the present state of our knowledge concerning the serum test for typhoid fever, it seems necessary, as in the trial of any new means of diag-

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nosis, that the fullest collateral information available be obtained. Hence it is requested in Original Case No.....Name.....
reported by you.....
.....in which the reaction was.....
....., that the following information be furnished as soon as the patient is dismissed from your care:

How long did the disease continue?.....

What conditions suggestive of typhoid fever were present and on what days were they noted? (Please arrange data in the following order and fill in where possible:)

Alimentary system (tongue, stomach, intestines—diarrhoea, hemorrhage, etc.)
.....
Skin (if spots appeared, when? etc.).....
Urinary system (albumin, presence or absence of diazo reaction, if tested)
.....
Respiratory system (epistaxis, bronchitis, pneumonia, etc.).....
Nervous system.....
Circulatory system and spleen.....
.....
Temperature (daily, if possible, if not, some general idea may be given).....
Facial aspect.....
If case resulted fatally, please give post-mortem findings and send the spleen to the laboratory sealed up in a sterile vessel.

If condition suggested typhoid primarily, when could a certain clinical diagnosis have been made?.....

What is diagnosis now, from clinical aspect *alone?*.....

Has patient had typhoid fever before; if so, when?.....

Remarks .....

It is requested that later specimens be sent in from this case fortnightly if possible.

Return this, when filled out, to the laboratory.

F. F. WESBROOK,
Director.

The results of all examinations and all clinical data of each case, whether received with subsequent specimens (which are invariably asked for) or from letters, or on the above blank furnished for the purpose, are entered on the following:

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TABLE OF SERUM TESTS FOR TYPHOID FEVER MADE FOR DR.....

FIRST EXAMINATION.																
Patient.	Age.	Sex.	Supposed source of infection.	Physician's initial diagnosis.	Final clinical diagnosis.	Case No.	Date.	Day of disease.	Temperature.	Culture.	Reaction.	Space for following examination.	Continuance of disease.	When could certain clinical diagnosis have been made?	Post-mortem findings.	When, if at all, has patient had typhoid before?	Remarks.

Up to the present date (Oct. 21, 1897) 1,845 specimens of blood, taken from 1,019 cases of suspected typhoid, and from eighty-one patients suffering from other diseases, have been examined. Some of the non-typhoid cases in which no reaction was demonstrable were as follows:

Appendicitis	4 cases.
Bronchitis	2 cases.
Cystitis	1 case.
Diphtheria	1 case.
Entero-colitis	5 cases.
Erysipelas	1 case.
Gonorrhœa	1 case.
Indigestion (acute)	5 cases.
La grippe	12 cases.
Lumbar abscess	1 case.
Malaria	5 cases.
Mastoid disease	1 case.
Melancholia	1 case.
Pleurisy	1 case.
Pneumonia	8 cases.
Rheumatism	2 cases.
Tonsilitis	5 cases.

One positive and one partial reaction were obtained, respectively, in two cases clinically diagnosed as "la grippe."

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One case of acute mania failed to react, but another case gave two positive reactions. In one case of puerperal mania a reaction was found.

The blood reacted positively in a somewhat doubtful case of pulmonary tuberculosis and doubtfully in each of two certain cases of the same.

Two marked reactions were obtained in the case of a child, inmate of a hospital, suffering from polio-myelitis, with paralysis of the lower extremities, and having had an irregular temperature for over a year.

Although in none of the eight cases just quoted could a history of previous typhoid infection be obtained, neither could it, with any certainty, be excluded in any of them, for these patients were living in a city in which typhoid fever has been endemic for the last ten years.

One case which had been diagnosed appendicitis, in which an apparently normal appendix was removed, gave a few days later a positive reaction, followed by the ordinary group of typhoid symptoms.

In all cases to which reference has been made the specimens were collected on paper, or in small amounts on glass, so that no weighed dilution nor reëxamination of the same specimen was possible. A dilution of about 1 in 25 (colorimetric) was used.

The following is a list of cases in which a reaction was observed on or before the seventh day:

First day	3 cases.
Second day	26 cases.
Third day	29 cases.
Fourth day	53 cases.
Fifth day	38 cases.
Sixth day	44 cases.
Seventh day	70 cases.
Total	263 cases.

These 263 cases out of 687 cases of undoubted typhoid fever will thus be seen to have given the reaction before the eighth day.

That this percentage is not greater may perhaps be partly explained by the fact that specimens are often received for the first time from cases so late as the third week, while those sent early in the disease and in which the reaction is initially absent, are not followed by others for later examination until, in all probability, the reaction has been well established for some days. This is evidenced by the following table, in which the reaction was found absent or doubtful as late as the days named, though afterwards present:

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Absent in 7 cases as late as the 8th day.
Absent in 5 cases as late as the 9th day.
Absent in 5 cases as late as the 10th day.
Absent in 8 cases as late as the 12th day.
Absent in 3 cases as late as the 14th day.
Absent in 1 case as late as the 22d day.
Absent in 1 case as late as the 36th day (Case A).
Absent in 1 case as late as the 40th day (Case B).

In these 294 cases alone was it possible to make any comparatively accurate determination of the first date of appearance of the reaction. In the other cases the specimens giving on first examination a positive result were received too late in the disease to be of value for this purpose.

Two of the cases above quoted deserve passing attention.

In Case A, where the reaction was probably delayed as late as the thirty-sixth day, examinations were made as follows:

Second day, negative; twenty-fifth day, incomplete (at this time defervescence began); thirty-sixth day, negative; on the fifty-fifth day a relapse occurred, and the reaction was present in a dilution of 1 to 50 fresh blood, or 1 to 200 dried blood, on the fifty-seventh day.

In Case B, in which the reaction did not appear until after the fortieth day, examination showed the following:

Eighth day, negative; fifteenth, negative; thirtieth, negative; thirty-third, faint grouping; thirty-fifth, negative; thirty-eighth, negative; fortieth, partial but incomplete; forty-third, positive (1 to 50, as are also the following): forty-seventh, positive; sixty-fourth, positive; sixty-eighth, positive; seventy-eighth, partial grouping; eighty-fourth, positive.

Early this case showed symptoms of acute indigestion only, all pyrexia subsiding after the second week. No symptoms indicating the disease occurred at any time later in the history.

In Case A, is there not a possibility that the first symptoms were not due to an infection of *B. typhi abdominalis* at all, and that the so-called relapse was due to this micro-organism?

In both cases the opportunity for a mild typhoid infection occurring in those already, by reason of disturbed nutrition, rendered more susceptible, at the end of some days, would suggest itself, as affording a possible, if not probable, explanation of the findings.

A peculiarity to be noted in the following three cases is the temporary disappearance of the reaction, whose appearance had been observed on two or three occasions earlier in the disease, and again several times later.

Case C (reported at Montreal)—Examinations on the ninth and

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thirteenth days gave negative results. On the twelfth, nineteenth and twentieth days a reaction was obtained. On the twenty-first day repeated trials failed to show a reaction, although it was well marked on the twenty-fifth, twenty-ninth and thirty-fourth days.

Case D—On the third, thirteenth and eighteenth days reactions were positive. On the twenty-fifth day none could be obtained, but on the twenty-sixth, fortieth, ninetieth and one hundred and twenty-third days, examinations yielded positive results.

Case E—On the second, fifth and tenth days positive results were obtained. On the twenty-first day no reaction was obtainable, though it was well marked on the fifty-second and sixty-sixth days.

In two cases the absence of the reaction on the twenty-first day and on the twenty-fifth day in the third case, or at the beginning of the fourth week in all, may be more than mere coincidence, as it was well marked at every other trial, after having been established, except in Case C, on the thirteenth day.

No attempt at explanation is here offered, as the cases were all those in which the ordinary symptoms of typhoid fever were present, without anything in the clinical history suggestive of a reason for the disappearance of the reaction.

All of these examinations were repeated with the same specimens several times without variation in the results obtained. The dilutions were made as strong as 1 to 10.

As to the accuracy of diagnosis afforded by this method, and the relationship between its results and clinical observations, it may be here mentioned that of the "Special Notices, No. 4," in which the detailed accounts of clinical observations were asked for, only 314 were filled out and returned by physicians, and in none of these was there a difference of opinion between the physicians and laboratory diagnosis, except in those cases noted above.

As will therefore be seen, of the 1,019 cases of suspected typhoid fever examined, whenever specimens were afforded early in the disease, reactions were delayed only in thirty-one cases until after the seventh day, and in all but three it appeared between the fourteenth and twenty-second days.

In two cases it disappeared during one examination, and in one case two examinations, but was present in all other examinations. In the eight cases of other diseases in which a partial or complete reaction was present the possibility of a concurrent or previous typhoid infection could not be eliminated.

Taking all these facts, adverse as well as favorable, into consideration, the results here reported must serve to corroborate the ex-

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treme accuracy of the method as pointed out, and estimated by previous observers.[3]

Even should it be conceded that in the very best hospitals, where every facility and the very best men are available, as great accuracy may be obtained, the employment of the method by public health laboratories places an opportunity for accurate diagnosis at the disposal of both patient and physician such as would not otherwise be available.

Several authors, amongst them Johnston and Welch, have advocated the adoption of Widal's application of the previously known, possibly bio-chemical principle, as routine work in public health laboratories, and several laboratories have taken the suggestion.

As a result of these routine examinations, together with the clinical and other data and material furnished by interested and progressive physicians, much information has been obtained; but is the possibility for good to cease at the point of affording correct diagnosis as a basis of treatment and the furthering of knowledge amongst medical men?

There seems to be a wider field of usefulness for this method in the protection of public health from the contaminating sources made apparent by its use, which is almost, if not quite, equal to that afforded by the cultural diagnosis of diphtheria.

In both of these diseases there is need of the adoption of radical methods which, working occasional hardship to the individual, may serve to protect the masses.

Education of the public is demanded in both, and in many cases where it has been tried, the establishment of certain fixed rules by those in authority leads to this more directly than by awaiting a demand for such action from the public, educated gradually by other means.

The establishment or proposed enforcement of some regulation

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[3]Widal & Sicard, Annales de l'Institut Pasteur, 1897—No. 5.—*Le Bulletin Medicale*, 1896, p. 934.

Johnston & McTaggart, *British Medical Journal*, Dec. 5, 1896; *Montreal Medical Journal*, March, 1897.

Chantemesse, *Le Bulletin Medicale*, 1897, p. 314.

Courmont, Societé de Biologie, Feb. 19 and March 20, 1897; *Le Bulletin Medicale*, 1897, p. 519.

Stern, *Berliner Klinische Wochenschrift*, 1897, Nos. 11 and 12.

Block, *Journal of American Medical Association*. July 3, 1896.

Johnston, *New York Medical Journal*, Oct. 31, 1896.

Welch, *Journal of American Medical Association*, Aug. 14, 1897. For a general account of the present knowledge of the principles involved and an estimate of the work of various observers up to this time, this paper is of highest possible value.

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leads to inquiries on the part of the people addressed to their physician, friends, or advisers, who, in their turn, thus compelled to take an interest in the matter, seek information when they do not already possess it.

Observations of all investigators who have had an opportunity to study the matter, serve to show that during an illness characterized by the typhoid reaction of the blood, even when clinical or microscopic post-mortem findings are doubtful or negative, *B. typhi abdominalis* may be found in the feces, bile, urine, spleen, blood, liver or elsewhere.

Bearing this in mind, and that the micro-organism is one which is readily destroyed although capable of very wide distribution, some more determined attempt should be made to deal with the infectious material and guard the avenues of possible escape.

As the presence of *B. diphtheriae* may produce the clinically typical disease or may show few or no evidences of its presence, and in the latter event be widely distributed, so in typhoid fever with marked or masked symptoms we may have bacilli capable of producing directly the disease in others or polluting a food or water supply. In both, too, there is the possibility of locating and dealing with the dangerous elements. That the one disease (diphtheria) is as a rule more immediately fatal is probably true, but those cases of mild infection or those showing no symptoms at all in which the bacilli are accidentally discovered must be considered with those more or less typical. (Such a grouping, dependent upon the laboratory diagnosis, greatly reduces the mortality percentage, and may also partly account for the splendid statistics of the antitoxine treatment.

It may be argued that occasionally a typhoid reaction may be obtained which has persisted for years, or that for other reasons is present without any corresponding bacterial infection. Should such very exceptional cases be treated like others in which undoubted infection is present, so far as being reported to or instructed by boards of health? Frequent reëxaminations, and if necessary, a bacteriological study, of the materials in which *B. typhi abdominalis* might be expected to be present, could, if necessary, be made while the physician in the interest of his final diagnosis, should it not correspond with the laboratory report, might be expected to furnish additional light on the matter in order to relieve his patient of further trouble.

The absence of a safe, reliable and quick method of demonstrating the presence of *B. typhi abdominalis* has hitherto stood in the way of a laboratory diagnosis as in diphtheria, but the reaction of

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the blood is quick and accurate, and can be taken as evidence that the bacillus is or has been present somewhere in the body.

The presence of the micro-organism might be inferred or excluded by clinicians alone in many cases from the history.

It is not the aim of the present communication to specify measures for isolation, disinfection, etc., but to point out the demands made by the accuracy of this method which brings with it not only new possibilities, but new responsibilities not lightly to be ignored.

Should all cases in which the reaction is present be placed under observation of the local board of health those anomalous cases in which, for good reason, on investigation, there later appeared evidence of no corresponding infection, might be thereupon released.

The fixation of an arbitrary time limit at the expiration of which a patient could be released or abandon a part of the rigid routine before practiced would do away with the necessity of bacteriological investigations, involving great trouble to the laboratory and inconvenience and delay to the patient.

Whether sufficient data have been acquired as to the relationship of a prolonged reaction to a long or short period of bacterial infection, to justify such an arbitrary fixation of a time limit, is a matter for consideration. What investigation accomplished, even before the adoption of the serum test, served to show that the bacilli are usually more easily isolated from fecal material in the early part of the disease and absent or difficult of demonstration in the latter stages.

The reaction appears in many cases several days before a certain diagnosis could be arrived at from clinical findings alone, and in these cases protective measures are thus rendered possible earlier in the disease.

A few suggestions of the points to be guarded and the difficulties to be encountered might here be given, without, however, making any attempt to formulate fixed rules.

On the finding of a reaction in a specimen of blood submitted for examination, the local health officer might send an inspector, or where this is impracticable, ask the physician in charge to report fully in a blank form provided for the purpose, upon the hygienic conditions previously and at the time existing, and the possibilities for rendering infectious materials harmless.

In any event, the patient's family, or those brought in contact with the case, should be furnished with accurate printed or verbal information concerning the nature of the disease, and the necessity for care in certain specific matters, such as disinfection of patient, stools, urine, possibly hæmorrhagic discharges from bowels, nose, or, in cases of abortion, from the uterus.

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Disinfection of clothes, bed linen, etc., should be as rigidly enforced as in cases of Asiatic cholera, a disease much more dreaded, but neither so costly to state and individual nor so destructive to human life.

In cases where the reaction appears to contradict clinical findings it would be no great hardship to require compliance with certain rules until either the reaction disappears, if it should do so quickly and permanently, or clinical or bacteriological investigation shows the improbability of danger from the bacteria which may have been present. Let the physician endeavor to show cause why the regulations should not be applied in the case.

The fact that here the proceedings are instituted on the demonstration of a condition of the blood which has been found wonderfully constant in infections with *B. typhoid abdominalis*, and not on the actual finding of the micro-organism itself, is an argument against using the reaction as a basis for protective regulations. In the absence of a satisfactory bacteriological method, and while such is being sought by all interested in the matter, would it not be wise to use the most accurate method immediately available, and err, if at all, on the safe side, since, if freedom from such infectious diseases as diphtheria and typhoid fever is to be attained, vigorous methods are demanded?

ELEMENTS OF ERROR IN INTERPRETING THE WIDAL REACTION IN TYPHOID FEVER.[1]

BY LOUIS BLANCHARD WILSON, M. D.,

Senior Assistant Bacteriologist of the Bacteriological Laboratory of the Minnesota State Board of Health.

In the two years which have passed since the first publication, by Fernand Widal,[2] of the serum reaction for typhoid fever, the results of the test in several thousand suspected cases have been reported[3] in the literature of the subject. Of the many observers, only one gives a low percentage of accuracy—seventy-seven per cent. This observer, reporting on 194 cases, includes in his list of possible errors many cases on which it is evident that too early and too few observations were made.

Aside from this list the percentage of accuracy claimed by the various observers ranges from ninety-two to ninety-nine per cent.

Up to May 1, 1898, some 3,000 specimens of blood from 1,595

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[1]Read before the Minnesota State Medical Association, June 15, 1898.
[2]Widal, F., *Le Bulletin Medicale*, June 26, 1896.
[3]Thompson, Gilman, *British Medical Journal*, Dec. 18, 1897.

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patients had been tested in the laboratory of the Minnesota state board of health. Only the first thousand of these cases have as yet been accurately tabulated, but the percentage of error appears to be a trifle over five per cent, or accuracy above ninety-four per cent. Dr. Barber of this city has studied clinically 350 and reported[4] on 205 of the cases tested in the state board's laboratory, and notes but one error in all, or a percentage of accuracy closely approaching 100 per cent.

When the Widal reaction for typhoid fever was first brought before the scientific world there were many who, from reasonable premises, prophesied that it would become almost a pathogomonic sign for the disease. But though the degree of accuracy attained, as will be seen from the foregoing figures, is already very great (probably averaging ninety-five per cent), yet the test is not apparently as certain as sputum examinations in pneumonic phthisis, as throat cultures in diphtheria, nor as animal inoculations in rabies. What, then, are the elements of error in this, which would appear, on bacteriological grounds, to be a highly specific diagnostic phenomenon?

First of all may be considered errors of technique. It is obviously necessary that a chemical, or bio-chemical, test, which, as usually made, is microscopical as well, must be made with accurately proportioned reagents, unmixed with foreign substances, and by a competent observer. As a rule, upon the clinician rests the burden of transmitting to the laboratory blood that is blood, and not a hopeless mixture of extraneous matter, nor a seething mass of bacteria. Of the many methods proposed for accomplishing this result, the modifications of the original plan of transmitting dried blood, first put into active use by Dr. Wyatt Johnston[5] of Montreal, have given the most general satisfaction.

The modification devised by the writer,[6] and used in the collection and examination of some 1,500 specimens, consists essentially in the collection of the blood on a square of polished aluminum foil, its transmission to the laboratory in tight packet formed by rolling and folding the foil, and finally the accurate weighing and diluting of the dried blood. The work of the collector is very simple. The skin at the point from which the blood is to be obtained must be thoroughly cleaned, preferably with boiled water. It is then pricked deeply with a clean large needle or small scalpel. Four or five large drops of blood are then removed and placed near one edge of the

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[4]Barber, J. P., *New York Medical Journal*, April 16, 1898.
[5]Johnston, Wyatt, *New York Medical Journal*, Oct. 31, 1896.
[6]Wesbrook and Wilson, *Philadelphia Medical Journal*, March 26, 1898.

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square of aluminum foil. The metal is then made into a roll about 1 cm. in diameter, turning inward the edge bearing the blood. One end of the roll is then flattened, and the edge turned over to prevent it from opening. The blood is then allowed to dry. If this is not done when it reaches the laboratory it may be badly smeared over the aluminum, and in warm weather may even be contaminated by bacteria. When the blood is dry the roll is flattened and the open end turned over, thus making a tight packet.

It requires from five to ten minutes for the blood to dry. Aside from this the actual time spent in the proper collection of a specimen need not be over two minutes. The whole outfit for the collection of a specimen is so small and light, so easily obtained, used, and forwarded, that there would seem no longer to be any excuse for the various makeshifts, such as paper, rags, glass, and bits of broken crockery, which have sometimes been pressed into service.

When a specimen, which has been properly collected, dried, and forwarded, is opened in the laboratory, the blood readily flakes off from the foil, and is with ease accurately weighed and diluted.

It is not necessary to discuss in detail here the laboratory technique. Suffice to say, the observer must be competent and conscientious, must make accurate dilutions, must use cultures with whose purity, motility and reactionary power he is familiar by daily observations, and must exercise considerable judgment in adjusting the time limit to the degree of dilution employed and the amount of agglutination which shall be considered a reaction.

But with good technique throughout, reactions certainly have been occasionally missed in cases which clinically were typhoid fever, and again have been obtained in cases in which there was little or no clinical evidence of the disease.

Probably the failures to find the reaction in cases of clinical typhoid are most generally due to too early or too few examinations. The agglutinating principle is in a very large percentage of the cases present as early as the seventh day of the disease, but in some instances it is not found until the close of the second or even of the third week. In a few isolated cases it has even been missed entirely until a relapse in the fifth or sixth week. Again, it has been found to become so feeble at times during the course of the disease as to be almost impossible of recognition. In about twenty-five cases reported to date it has not been found at all in daily tests made during the entire period of clinical typhoid to convalescence. All these anomalies taken together, however, make up less than one per cent of the cases tested.

We do not understand these delayed or absent reactions, and can-

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not even form a working hypothesis to account for them until we know more of the agglutinating substance itself, e. g., whether it is toxic or immunizing, or, if neither, with what condition of the body fluids it is associated. It is possible that some of the cases of apparent clinical typhoid without reaction may be due to infection with Gärtner's bacillus, as shown in a few cases reported by Durham.[8] But the cases, few as they are, teach us to be persistent in the collection and testing of specimens. Indeed, at least until the diagnosis is clearly established, it should be as much a routine matter as the taking of the patient's temperature. And even if the reaction does not appear at all, we have no right, in our present state of ignorance, to relinquish a diagnosis of the typhoid fever if the clinical symptoms support it.

When we come to consider the third element of error in the typhoid reaction, namely, the occasional appearance of the phenomenon in the apparently healthy individual, or in those without the clinical symptoms of typhoid fever, we are a little, though a very little, more able to explain it.

Of course, it is within the range of theoretical possibility that two different species of bacteria growing within the body should produce precisely the same bio-chemical substance, or that they should cause the same reaction of the organism to their toxines, and thus indirectly the production of the same substance. Such a supposition is, however, practically so highly improbable that it seems almost absurd. There seems quite as much reason for the specificity of the agglutinating substance in typhoid fever as of diphtheria antitoxine, tuberculin, and the other direct and reactionary products of bacterial development.

It, then, is germain to inquire into the possibility of error in the clinical diagnosis, or in the exclusion of a previous typhoid infection from which the reaction may be still persistent.

It is not the writer's purpose to attempt to give in detail the various difficulties met with in the clinical diagnosis of typhoid fever. But it must be noted that the anomalous cases in which either the diagnostic symptoms, or the usual anatomical intestinal lesions were absent, and yet in which the typhoid bacillus has been isolated from various organs of the body, have rapidly multiplied within the last two years.

Duflocq[9] analyzes forty-nine cases, taken from recent literature,

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[7]Brill, *New York Medical Journal*, Jan. 8, 1898.
[8]Durham, *London Lancet*, Feb. 15, 1898.
[9]Duflocq, Lecons sur les Bacteries Pathogenes, 1897.

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in which the typhoid bacillus has been isolated from portions of the body whose inflammation would not have produced symptoms ordinarily recognized as typhoid fever.

These include five cases of abscess of the skin, eleven of periostitis, three of osteomyelitis, eleven of costal chondritis, two of thyroiditis, four of meningitis, five of pleurisy, two of orchitis, one of epididymitis, one of an ovarian cyst, two of suppurating kidney, one of liver abscess, and one of biliary calculus.

Some of these occurred in the course of ordinary or atypical typhoid; others months or years after the original attack; and others, still, gave no history whatever of typhoid fever. In a case, quoted by Professor Welch,[9] occurring recently at the Johns Hopkins Hospital, a positive serum reaction was obtained, and "Dr. Flexner cultivated in a large number typical typhoid bacilli from the gall bladder, although there was no previous history of typhoid fever, and there were no intestinal lesions."

Recently Cushing[11] has reported one case and reviewed five others of cholecystitis in which the bacillus typhosus was isolated from the gall bladder. Four of these were following typhoid fever, in the fifth the history was uncertain, and in the sixth there was no history of previous typhoid. Miller[12] reports the isolation of *B. typhosus* from the gall bladder seven years after typhoid fever.

Quite as much care would seem to be necessary in drawing conclusions from negative anatomical autopsy findings as from negative clinical data.

Besides the cases quoted above—several of which showed no intestinal lesions—there have been summarized from the recent literature, by Flexner[13] and by Nicholls and Keenan[14] of Montreal, eighteen cases which exhibited more or less of the symptoms of typhoid fever, but which post mortem were found to be entirely without intestinal lesions, and yet yielded culturally from the spleen and other organs as well the bacillus of Eberth. In several of these the spleen was not enlarged, though from it the bacilli were cultivated.

In a case of Dr. Flexner's,[13] the patient's symptoms during the two days he was under observation at the Johns Hopkins Hospital were almost entirely thoracic. The spleen was not palpable. Post mortem: The chief gross lesion was gangrene of the lung, with per-

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[11] Cushing, Johns Hopkins Hospital Bulletin, May, 1898.
[9] Welch, Journal American Medical Association, Aug. 14, 1897.
[14] Nicholls and Keenan, *Montreal Medical Journal*, January, 1898.
[12] Miller, Johns Hopkins Hospital Bulletin, May, 1898.
[13] Flexner, Johns Hopkins Bulletin, December, 1897.

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foration of the pleura. The oesophagus, stomach and intestines showed nothing abnormal. The mesenteric glands were not swollen, yet typhoid bacilli were isolated in large numbers from both lungs, the spleen and liver.

In Guinon and Meunier[15] case the symptoms had been those of acute miliary tuberculosis and typhoid fever. The serum reaction was present. Post mortem: The lesions were only those of acute miliary tuberculosis, small typically tubercular ulcers being present in the intestine. Typhoid bacilli were cultivated from the spleen and other organs. Both the symptoms and the bacteriological findings showed that the typhoid infection was already disappearing. Had the case, therefore, come to autopsy a few weeks later, it would probably have been quoted as discrediting the Widal reaction.

It would seem necessary from the evidence furnished by the foregoing cases to relinquish the old idea that *B. typhosus* does not invade organs other than the alimentary canal. Indeed, it would appear that the intestine is not at all necessarily the site of primary invasion even. This is in accord with the laboratory experience, that the bacilli may be sufficiently dried to be readily blown about as dust and yet not be killed, and with the animal experiments of Sanarelli,[16] who concludes the disease in animals is not primarily one of the intestine, but of the mesenteric glands.

Commenting on certain of the cases which have been cited, Professor Welch[10] says: "We are justified in the light of such cases as these in demanding that thorough bacteriologic examinations be made before cases which have given during life the characteristic serum reaction, but which do not present at autopsy the anatomic lesions of typhoid fever, be recorded as free from infection with the typhoid bacillus."

Since it is true, then, that we may not only have typhoid fever without intestinal lesions, but may also have typhoid infection without typhoid fever, it is readily seen how difficult it is to exclude a present typhoid infection by clinical evidence alone, or a previous typhoid infection by the history given by a patient or his friends.

The numerous cases of "mild," "afebrile," or "abortive" typhoid which occur during epidemics of the disease, especially where the common water supply is infected, do not frequently exhibit intense or long persistent agglutinating properties, but their possibility must be taken into account in excluding previous typhoid infections.

It may be noted in passing that this class of cases would appear to be of little value in determining the accuracy of the Widal, or

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[15]Guinon and Meunier, *Le Bulletin Medicale*, 1897, p. 313.
[16]Sanarelli, Annales de l'Institut Pasteur, November, 1892, and April, 1894.

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any other test for typhoid fever, except in those rare instances in which evidence other than clinical is furnished of their true nature.

The foregoing notes may be summarized into the following practical rules for the interpretation of the serum reaction:

1. A negative reaction indicates, (a) that the patient does not have typhoid infection; or, (b) that it is too early in the course of the disease for the reaction to appear; or, (c) (rarely) that the case, though clinically typhoid fever, gives no reaction. In other words, a single negative reaction is of little value.

2. A positive reaction indicates that the patient has now, or (rarely) has had in the recent past, an infection with the bacilli of typhoid fever. Note that while he may not have typical typhoid fever, the presence of the reaction, except in the rare instances of persistence from a previous infection, indicates the presence of the germs of the disease.

3. In doubtful cases the daily examination of specimens will aid materially in fixing the diagnosis.

A PRELIMINARY COMMUNICATION ON BACILLUS DIPHTHERIAE AND ITS VARIANTS IN A SCHOOL IN WHICH DIPHTHERIA WAS ENDEMIC.[1]

BY

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ENDEMIC DIPHTHERIA IN A SCHOOL.

In presenting observations on what has become almost the commonest of routine bacteriological diagnosis, a word of explanation and perhaps of apology seems due. An opportunity has, however, been recently afforded of studying the morphological, cultural and pathogenic characteristics of this bacillus, under circumstances which have borne out well their early promise of developing great variation.

About fourteen months ago bacteriological examinations were begun to determine the reason for the frequent occurrence of cases of diphtheria and sore throats in a state institution, in which from

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[1]Presented to the Section of Public Medicine of the British Medical Association, at Montreal.

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230 to 275 children are constantly housed and educated. An idea of the local conditions and treatment may be obtained from the following sketch by Dr. Adair:

THE CHARACTER OF THE INSTITUTION.

The institution in question is situated upon a commanding eminence, the buildings comprising it being arranged in the form of an irregular semicircle. The elevation allows of free, natural drainage, and the character of the soil (loam overlying sand) is such as to prohibit unusual moisture.

The water supply is received from a driven well on the grounds, pumped into tanks and delivered by direct pressure to the various buildings. A careful oversight of both water and tanks is maintained, and examinations made at intervals to test the purity and potability of the supply. Investigations in this direction have been practically negative in character, so far as demonstrating the presence of organic matter in objectionable quantities. The plumbing is of the latest sanitary pattern, installed under rigid specifications, and maintained free from defect or leakage. The entire plant is heated by steam and lighted by electricity. A herd of Holstein cows is kept on the farm of the institution, and the barns and yards are exceptionally neat and clean.

The form of institutional life adopted is the so-called "cottage" plan; the children being grouped according to age and sex into cottages, of which there are at present five, each under the care of a competent matron who has charge of and is responsible for the children committed to her care. Each cottage has a sleeping capacity of about forty, the dormitories being located on the second floor and ample provision made for ventilation in all rooms.

The children from the different cottages receive their meals in one common dining room, situated in the main or administration building, and also come freely in contact with each other daily in the schoolrooms of the institution, in the assembly hall where they meet for worship, and on the playgrounds of the campus.

The beneficiaries of the institution have in general come from homes where poverty and filth reign supreme, but fortunately do not, as a rule, bear the imprint of the cachexias of childhood. Whether this is due to the fact that they are recruited mainly from the rural communities of the state, where at least they have been assured of healthy, if coarse, food and some kind of shelter, or not, the fact remains that they seem no more subject to strumous, rachitic, or specific troubles than the children of people in the better walks of life.

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THE PREVALENCE OF DIPHTHERIA.

Notwithstanding this, diphtheria has practically been endemic in the institution since its first year of operation (1887). At times latent and apparently under control by the ordinary measures used for the eradication of contagious diseases, the peculiarly elusive character of the poison has been manifested again and again by its reappearance at intervals, usually when least expected. Quarantine, maintained for the customary period, that is, till such time as the patient was fully convalescent, and for some weeks afterwards, was adopted as a routine measure, and, so far as practicable, rigidly enforced. A building, small and ill-arranged, used for the first few years as a hospital for the reception of all sick, was, upon the erection of the larger and more commodious house two years ago, set apart as a detention ward for the reception of new arrivals, in accordance with a plan to be described presently.

A particularly severe outburst in the summer of 1896, comprising more than forty cases of undoubted diphtheria, confirmed by bacteriological findings, gave rise to an investigation of the possible sources of the disease, including the plumbing, water and milk supply, and, in short, everything connected with the institution capable of acting as a medium for its production and transmission. The absolutely negative results obtained led to the careful consideration of the question as to how far the trouble could be attributed to a throat-to-throat transmission through the medium of children themselves immune.

METHODS ATTEMPTED FOR CHECKING THE PREVALENCE.

In order to understand intelligently the conditions, a brief description of the plan adopted for checking the spread of the disease may be given. Each child, upon his arrival at the school, receives a complete change of clothing, a warm bath, and a culture is taken from his throat. After remaining in the detention ward for two weeks, a second culture is taken, and, if pronounced negative, he is assigned to a cottage, provided that the first examination was also negative. The necessity of obtaining at least two reports of the freedom of the throat from even suspicious-looking bacilli seemed imperative from the results of the early examinations, and this procedure has been in operation about three months.

The somewhat cramped condition of the quarantine building, caused by its occupancy by all children whose throats show suspicious bacilli, whether apparently healthy or with clinical evidence

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of infection, often necessitates the placing of several children in the same room.

Children whose throats have been once reported clear are placed together in a freshly disinfected room, where they are detained until all give two successive negative examinations. This frequently necessitates the re-examination of throats which have already been pronounced clear on several occasions.

Upon the occurrence of symptoms of sore throat among the inmates of any cottage, cultures from the throats are at once made, and, if suspicious-looking bacilli are found, the children are at once removed to the hospital, isolated and subjected to treatment, which is maintained until such time as two successive cultures prove to be negative. In this connection it was found that children in perfect health, who had shown no departure from a normal condition for months, and some with absolutely no history of any illness, however slight, during their residence in the school, extending over a period of one to two years, gave typical cultures of *B. diphtheriae*. It was found, in addition to this, that the usual length of time supposed to be requisite for quarantine was occasionally entirely too brief, the bacilli persisting for months in the throats of children recovering from acute attacks, on whom local treatment, faithfully carried out, seemed incapable of ridding the tissues of bacilli.

"TYPICAL" AND "ATYPICAL" BACILLI.

The matter of the differentiation of *B. diphtheriae* and its variants from allied forms seems to be, in spite of the huge amount of investigation done and being done, in a very unsettled condition. It is necessary, then, to state what is meant in this paper by "typical" and "atypical" diphtheria bacilli. The examinations have been made by the usual methods of growing the bacteria from throats upon ordinary Loeffler's serum, or more usually that modified by the addition of 1.25 per cent glycerine. Cover-glass preparations from cultures of twelve to eighteen hours' growth are stained with Loeffler's methylene blue. Specimens thus prepared show what have been designated "typical diphtheria" bacilli, namely, short and long forms with polar granules, large club, dumbbell, and irregular forms, and, rarely, except in cultures somewhat older, "ghost" forms. It may be mentioned that cultures of that age grown on the glycerine serum, and stained with Loeffler's methylene blue (Grübler's), always show polar granules in abundance. When pure, all of these forms, whether from healthy persons or cases of clinical diphtheria, show the same general cultural and pathogenic charac-

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teristics. In view of this it will be seen that the term "typical" employed throughout is practically based on morphological and cultural appearances.

DESCRIPTION OF "ATYPICAL" FORM.

Early in the examination of cases from this institution the occurrence of a bacillus was noted, which then and since has been (with one exception in 2,400 examinations) limited strictly to the said institution. This is the more striking since it was not found to occur anywhere else in the state, not even in the town on the edge of which the school is located. From glycerine serum cultures, pure or mixed, twelve to eighteen hours old, specimens stained with Loeffler's methylene blue show bacilli uniformly, and usually darkly, stained. They have never, at any stage of development on any of the ordinary media, shown polar granules. In size the variation is within narrower limits than is the case with "typical" forms, the minimum being about the same, while the maximum is not so large. These bacilli are usually somewhat thicker in the middle and with rounded ends, rarely club-shaped, or very frequently arranged in pairs whose proximal extremities are always thicker than the distal, the exact opposite of paired arrangement in "typical" forms. The so-called "Chinese character" arrangement is always present, and is, with the similarity in size, the only morphological resemblance to the "typical" forms above mentioned.

On glycerine serum the colonies develop somewhat more rapidly than is the case with the "typical" forms, are usually more elevated, and when old are of a darker color and more easily detached from the surface of the medium. They retain their vitality on this medium longer than do the "typical" forms under precisely similar conditions.

In agar cultures the colonies grow somewhat more luxuriantly, have a greater tendency to become confluent, more rarely show the "daisy" form, and are of a lighter color than colonies of the "typical" forms. Though broth cultures are more luxuriant, the changes in reaction and other peculiarities are identical with the "typical" forms. Cultures in litmus media, gelatine, etc., closely resemble *B. diphtheriae*.

This bacillus was found alone, mixed and alternating with "typical" forms of *B. diphtheriae*, both in cases of clinical diphtheria and in healthy individuals. Its virulence, when isolated from the above sources and tested on guinea pigs, is about equal to that of the "typical" forms, from similar or other sources.

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In determining whether or not this is an "atypical" form of *B. diphtheriae*, the following experiments were undertaken and are now in progress. Pure cultures of both "atypical" and "typical" forms from such sources as given above, the virulence of which had been determined, were given to guinea pigs immediately before inoculated, each with sixty units (Behring's standard) of No. 3 antitoxine (New York Health Department). Control animals of the same size and breed were inoculated without previous protection. The antitoxine was found to protect, not only against "typical" forms, but against the "atypical," while the controls died in varying times.

A somewhat similar method of procedure has been begun recently but on a limited scale. Serums obtained from blisters on individuals, both with clinical diphtheria and without symptoms, who had in their throats "atypical" forms unmixed at any time with "typical," and on healthy individuals in whose throats was *B. diphtheriae* ("typical" forms unmixed with "atypical"), were used for the protection of guinea pigs against both the form of the bacillus present in the throats of the individuals from whom them came and against the other form.

Too few experiments have been completed to justify the drawing of conclusions therefrom.

The results of animal experiments seem to fix this classification of "typical" and "atypical" forms of *B. diphtheriae*, which without them, and dependent wholly upon morphological and cultural peculiarities, would have been only a matter of conjecture.[1]

This apparently arbitrary grouping of forms met with, though later confirmed by the animal experiments already noted, grew out of the study of the tabulated results of a somewhat extended series of bacteriological examinations in each of a large number of individuals.

In all, cultures have been examined from 478 persons in the school. Of these 301 presented no symptoms of diphtheria, and gave negative bacteriological findings; five had some clinical symptoms which resembled those of diphtheria, but not even suspicious-looking bacilli were found on culture. The remaining 172, or thirty-six per cent of the whole number of throats examined, showed either "typical" or "atypical" diphtheria bacilli; fifty of these had clinical diphtheria, and "typical" germs unmixed at any time with "atypical" were present; eleven had clinical diphtheria and "atypical" bacilli,—no "typical" bacilli were present at any time in these;—seven had clinical symptoms of diphtheria, with mixture or alternation of the two forms; fifty-nine presented no symptoms, but

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yielded on examination "typical" forms unmixed at any time with "atypical;" seventeen were never ill, but the "atypical" forms were present without the "typical;" twenty-eight, at no time diphtheritic, were found to have mixed or alternating forms in their throats.

RESULTS OF THE BACTERIOLOGICAL EXAMINATIONS.

In bringing forward these examinations, it appeared best to select and group certain cases which presented points of special interest.[2]

Group I. consists of thirteen cases showing no clinical symptoms of diphtheria, but from all of which the "typical" forms of *B. diphtheriae* were obtained, and in which no "atypical" forms were ever observed. Of each of these thirteen cases from four to twelve examinations were made, and the bacilli were found present for periods varying from twenty to one hundred and fifteen days. Bacilli were studied in pure culture from eleven specimens. Nine of these were used for animal experiment. Inoculations of forty-hour broth cultures into guinea pigs killed usually in from three to seven days. In two, death was delayed until the twentieth day, but the "typical" forms were recovered from the seat of inoculation.

An illustrative case in this group is the following: Two weeks after the boy's admission to the school the routine examinations disclosed the presence of "typical" forms of *B. diphtheriæ* alone. They were still found present on examinations made 7, 18, 30, 94, 107 and 115 days afterwards. On the forty-third day no suspicious-looking bacilli were detected, this being the only time when they were not obtained between February 16th and June 11th. Cultures taken 11, 17 and 26 days after the latter date gave negative results, upon the report of which he was released from quarantine.

Group II. consists of six cases, exhibiting no clinical symptoms, and in which "atypical" but no "typical" bacilli were present during the observations. In each of the cases the "atypical" bacilli were found present one to five times in a series of examinations lasting from twenty to sixty-four days, and during which two to four negative diagnoses were given in each case. Pure cultures were studied in two instances.

One case of this group deserves a passing remark. The patient was received on May 27th, and nineteen days later "atypical" bacilli were found. On the ninth, seventeenth, thirty-fifth and sixty-fourth days thereafter they

[2]The paper as presented to the Section of Public Medicine was illustrated by a series of tables giving in detail every examination. These tables, owing to their form and length, it has been found impossible to reproduce here.

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were still to be obtained. On the twenty-sixth, forty-fifth, fifty-second and fifty-seventh days examinations gave negative results. Three consecutive examinations, embracing a period of fourteen days between the findings of the thirty-fifth and sixty-fourth days failed to show the presence of these or other suspicious-looking bacilli.

Group III. contains only cases (eight in all) of clinical diphtheria, with the "atypical" forms as the only suspicious-looking bacilli present. These cases were examined from three to twelve times each during a period of from thirty to eighty-one days, and the germs were present from one to six times in each case, accompanied with two to seven negative findings. Examinations of five of the cases some time before the onset of the disease gave negative results, followed by prompt positive findings after illness began. This is very unlike mere coincidence, and a causative relation between the presence of the "atypical" bacilli and the synchronous symptoms would appear to be well established. Pure cultures were studied from two specimens and a series of seven animal experiments made with these cultures. Guinea pigs were killed in three to ten days, and the bacilli, unchanged in morphology and biology, recovered from the seat of inoculation in all but three animals.

The following case of this group is interesting from the fact that she had been received in December, 1896, and two examinations made during that month gave negative results. She then returned to her home, and was readmitted May 14, 1897, and nine days later had a rise in temperature and sore throat, with the presence in her throat of "atypical" bacilli, which were still to be found in the last examinations made, which was on August 11th. Any possible immunity conferred by residence in the school during the first sojourn was seemingly lost during the stay at home.

Group IV. comprises four cases in which "atypical" forms were present at the beginning of clinical diphtheria, with typical or associated forms appearing later. For each six to thirteen examinations, during periods of from three to six months, were made, with from three to nine positive and from three to four negative findings. The "atypical" forms were studied in pure culture from three different sources amongst these cases.

One case of this group was admitted to the school May 24, 1897. Two weeks later he developed symptoms of diphtheria in a mild form, and his throat was shown to contain "atypical" forms of the bacilli alone. These were still present, unmixed, after thirty-five days, when they were obtained in pure culture. Eight and seventeen days after this, or forty-three and sixty-two days respectively after the inception of the disease, "typical" forms unmixed with "atypical were found. On the sixty-ninth day a negative examination was made, but eleven days after this the "atypical" forms again appeared. The case is still under observation.

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Group V. includes six cases of diphtheria in which "typical," "atypical," or associated forms, were present some time before clinical symptoms arose. Pure cultures of the "atypical" bacilli were obtained before the beginning of the disease in one case, and guinea pigs inoculated with these were killed in six to eight days, and the bacilli recovered (morphologically and culturally unchanged) from the seat of inoculation. Pure cultures of the "typical" forms were obtained in three instances. One of these was before the beginning of symptoms, and inoculations of this killed guinea pigs in fifteen to twenty-one days. In the latter instance bacilli were obtained in pure culture, and showed short but granular forms. In all the cases these conditions obtained from two to sixty-two days before clinical symptoms of diphtheria appeared. Typical forms were present previous to illness in four cases. In one of these the examination at time of illness showed the same bacilli. In two the two forms together or alternating appeared only during convalescence. In a fourth case a child, apparently healthy, developed typical diphtheria two days after taking the specimen, the examination of which showed the presence of "typical" bacilli. "Typical" forms ushered in the illness of one case, which had previously exhibited only the "atypical" forms. In one case both forms were present together two months before the inception of the disease, which was apparently due to "typical" forms alone. It is evident here that no immunity had been established by the previous throat infection.

One of these cases was admitted on April 7, 1897, and ten days later showed "typical" diphtheria bacilli of the short granular variety, associated with the ordinary "atypical" variety. Two negative examinations followed thirteen and eighteen days after the first, but twelve days after the last negative, or thirty days after the first positive, an acute attack of diphtheria began, and "typical" bacilli of the large, long form were present. These were found in four later examinations unmixed, but on the fifth examination, eighty days after the inception of the disease, the "atypical" forms again appeared, though the "typical" were still present. Eleven days after this the "atypical" forms alone were found.

Here we have a case which presented three different varieties of the bacilli, the presence of two of which failed to confer an immunity from the third.

Group VI. contains four cases which showed no symptoms, but in which one form of the bacillus was followed by the other form. The observations covered periods of from one and a half to three and a half months. Each case was examined five to nine times, with from two to six positive and one to four negative results. The "typical" forms were isolated and studied in pure culture from two sources in this series of cases.

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One case of this group was admitted on April 26th. Eight days later "atypical" bacilli were found, while on the twenty-fifth and thirty-eighth "typical" diphtheria bacilli alone were present. Examinations on the forty-sixth, seventy-seventh and eighty-fifth days gave negative results. "Typical" diphtheria bacilli again were present on the ninety-fourth and 101st days, and followed on the 112th day by "atypical" forms.

Group VII. consists of eighteen cases, which at no time while the examinations were in progress, periods of from two to six months, showed symptoms of diphtheria, but which had frequently or continuously present an irregular succession or mixture of the two forms. Five to seventeen examinations in each case were made, with from four to fifteen positive and from two to six negative findings. Pure culture inoculations of the "atypical" forms, which were isolated from five sources, killed guinea pigs in from eight to twenty-one days, with recovery of the bacilli in all but two instances. The "typical" forms were obtained in purity from sixteen sources, sometimes when the two forms were associated, and a series of seven animal experiments showed them to be capable of killing guinea pigs in from four to seventeen days, with the recovery of the bacilli in all but one animal, which died in fourteen days, the media inoculated from the seat of injection remaining sterile.

The first case of this group is perhaps the most interesting of any here reported. The boy is three years of age, and was admitted on Feb. 4, 1897. Twelve days later a culture from his throat showed both "typical" and "atypical" bacilli. Three successive examinations, nine, eighteen and twenty-five days thereafter, showed "typical" bacilli. The patient was described as croupy on the day of the last-mentioned examination, and antitoxine was given twice on the same day by way of experiment. In the evening the temperature, which had been 103 degrees Fahrenheit at 11 a. m., subsided to 99.8 degrees Fahrenheit, and was on the following morning normal, and so remained; 41, 70, 80, 94, 126, 139, 146, 154, 170 and 181 days from the beginning of the examinations, "typical" bacilli were found, alone in every instance except on the 146th and 181st days, when they were mixed with the "atypical" forms. On the 41st and 56th days, the "typical" bacilli were isolated in pure culture, and in doses of 1 c.cm. of forty-hour cultures, killed guinea pigs in fourteen and seventeen days respectively. In the latter experiment the "typical" bacilli were recovered in pure culture from the seat of inoculation in the animal; in the other instance no growth was obtained.

Here, then, is a case in which the "typical" bacilli were found fifteen times out of seventeen examinations, covering a period of over six months, and are possibly even yet present, as the last examination was made on Aug. 16, 1897.

On one of the two occasions on which no diphtheria bacilli were found, a very scant growth on the first culture, at an extremely busy time, prevented a satisfactory diagnosis, and another specimen was asked for. The occurrence of a croupy cough may appear to render questionable the classification of this case amongst those who never at any time exhibited clinical symptoms of diphtheria. The rapid subsidence of the temperature and absence of mon-

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tion in the hospital record may, however, be looked upon as indicating that this was a simple croupy condition, which, unless the patient had been under particular surveillance, would have escaped notice. The persistent spraying or swabbing of the patient's throat with corrosive sublimate, in strengths of from 1 in 1,000 to 1 in 250, as well as the use of diphtheria antitoxine, failed to rid the throat of this patient of the bacilli during six months.

THE "ATYPICAL" A VARIETY OF THE "TYPICAL" BACILLUS.

It is very evident that the term "atypical," throughout employed, indicates that the bacillus—though exhibiting well-marked morphological and a few cultural characteristics (see previous description), which are very unlike those usually described by others, and classed in this paper as "typical" forms of *B. diphtheriae*—is merely a variety of *B. diphtheriae*. From the comparatively few cases of illness accompanied by throat symptoms, from which these "atypical" forms, unmixed with "typical" diphtheria bacilli, were found, it would appear that these "atypical" bacilli—allowing that they are causative—produced a milder infection than some of the cases in which "typical" forms were found. The comparatively rare occurrence of this form alone, and the relative frequency of the occurrence of the "typical" form alone in cases of sore throat in this institution, may render any comparisons of the severity of the symptoms produced by the two forms misleading, hence too much stress must not be placed upon them. The results of all observations—clinical, bacteriological, and experimental (animal)—would lead to the conclusions that:

1. This "atypical" bacillus may remain in the human throat for months without producing any symptoms, or, on the other hand, may produce clinical symptoms not to be differentiated from diphtheria, which, so far as can be seen from these investigations, is apparently frequently of a milder type than when "typical" forms are present in the throat, either alone or mixed with the "atypical" variety.

2. It is a variety of *B. diphtheriae*, notwithstanding the frequent persistence of the type unchanged and unmixed with "typical" forms for months (*a*) in the throats of patients, (*b*) in all of the ordinary media, and (*c*) on passage through guinea pigs.

3. It must be distinguished both from the ordinary so-called "short forms" of *B. diphtheriae* by the constant absence of polar granules and the intensity and evenness of staining with methylene blue, and from any nonpathogenic, pseudo-diphtheria bacillus before described.[1]

The fact that ordinary diphtheria antitoxine protects animals

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against an otherwise fatal dose of this bacillus would seem to confirm these conclusions. The experiments with the blister serum, taken from cases in which the "atypical" forms were alone present, and by means of which guinea pigs are protected against lethal doses of both "typical" and "atypical" forms, may add additional proof.

It might here be mentioned that so far as experiments thus far made are concerned, the pathogenic and cultural characteristics of both "atypical" and "typical" forms do not vary with the time in the series of observations at which they were isolated. Thus cultures of both forms have shown bacilli not to be distinguished in morphology or pathogenesis from cultures isolated from the same cases some months either previously or later.

A study of these cases shows, in addition to the long persistence of both "atypical" and "typical" forms of *B. diphtheriae*, a recurrence of both, either alone or mixed, after a disappearance, evidenced by several successive negative examinations.

A negative break in a long line of positive examinations may be explained by

(1) Improper technique in taking the smear.

(2) Improper technique in making cultures from the smear.

(3) Overlooking bacilli in the culture when few are present amongst a large number of other bacteria.

(4) Their entire temporary disappearance.

If (4) be the cause, the recurrence may be, perhaps, attributed to the placing of several children in the same room, some of the children being free from the bacilli and becoming reinfected from others in whose throats the bacilli are still present.

GENERAL CONCLUSIONS.

From these examinations, if general conclusions may be permitted from such exceptional conditions as obtain in the school, some such suggestions as the following might be made, if such be deemed desirable, and if desirable practicable:[2]

1. That the throats of people brought in contact with diphtheria patients be examined, and if *B. diphtheriae* be found, that they be quarantined until free of the bacilli.

2. That freedom of the throats of diphtheria patients, or those brought in contact with them, from *B. diphtheriae* or its variants, be determined by at least two successive negative examinations.

[2]The results of the investigations of the New York Health Department led them to consider the adoption of rules similar in certain respects to these suggestions. See *Scientific Bulletin*, No. 1, Health Department, City of New York, 1895.

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3. That diphtheria patients, particularly while convalescent, be quarantined by placing, when possible, one patient in one room.

[1]These "atypical" forms may perhaps be included, so far as can be ascertained, from the written descriptions and plates, under the pseudo-diphtheria bacilli of Loeffler (*Berl. klin. Woch.*, 1890, No. 39), von Hoffman (*Wien. med. Woch.*, 1888, No. 3), Koplik (*New York Med. Journal*, 1892, August 27th), Escherich *Berl. klin. Woch.*, 1893, Nos. 21, 23), Beck (*Zeits. f. Hyg.*, 1890, Bd. viii.), Biggs, Park and Beebe (*Scientific Bulletin*, No. 1, New York Health Department, 1895), Cobbett and Phillips (*Journal of Path. and Bact.*, 1896, vol. iv), Peters (*Journal of Path. and Bact.*, 1896, vol. iv), or the so-designated attenuated forms of Roux and Yersin (*Ann. de l'Inst. Pasteur*, 1890, Martin (*Ann. de l'Inst. Pasteur*, 1890), Biggs, Park and Beebe (*Scientific Bulletin*, No. 1, New York Health Department, 1895), Peters (*Journal of Path. and Bact.*, 1896, vol. iv.), and other observers. It will be noted, however, that in the present communication shortness alone does not constitute the diagnostic feature. Uniformity in size and shape, intensity and evenness of staining, entire absence of polar granules, preserved in all stages of development in various media and in various cultures obtained from the same throats, and when passed through animals serve to distinguish this "atypical" form from the long, short, or medium-sized bacilli designated as "typical." The variability in these particulars is the most characteristic feature of the "typical" forms of *B. diphtheriæ* isolated in the same manner. The varying degrees of virulence of this "atypical" form—no greater, however, than of the "typical" form—serve to differentiate it from similar non-virulent forms of previous observers. In testing the virulence in every case 1 c.cm. per kilo. of body weight (guinea pig) of a 40-hour broth culture of the micro-organism to be tested was given subcutaneously.

PRELIMINARY REPORT ON THE LABORATORY DIAGNOSIS IN TWENTY CASES OF SUSPECTED RABIES.

By

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Investigation was begun in the cases of suspected rabies here presented in order to afford diagnoses as a basis for protective measures. Several of the earlier cases were from the city of St. Paul, where, in the municipal laboratory, Drs. Rothrock (bacteriologist) and Price (veterinarian) had already begun investigation. At their request the work for St. Paul was taken up by this laboratory.

Pressure of other work, the rapid influx of material from several

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[1]Presented to the American Public Health Association, at Philadelphia, Oct. 29, 1897.

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sources, as well as difficulty in securing and providing for the large number of animals necessary to follow each case through a long series of inoculations, prevented more prolonged observations. The high percentage of positive results obtained was in the nature of a surprise, in consideration of the supposedly rare occurrence of the disease in America, and particularly in Minnesota. This consideration has led to the presentation of the cases herein reported.

To Sept. 14, 1897, material had been received from twenty sources, and routine examinations by inoculations of an emulsion of the brain or spinal cord in sterile 0.67 per cent salt solution subdurally into rabbits were carried out. The freedom of the emulsion used for inoculation from micro-organisms was determined by cultures in the various media. The possibility of a microbic cause for the symptoms and death in the inoculated animals was eliminated by similar cultures, taken from the site of inoculation, blood and tissues. In all the earlier experiments the daily temperature (morning and evening) of the rabbits, from some time before inoculation until the time of death, was recorded. This was continued as far as practicable throughout.

Asepsis during operation was secured by shaving the skin, thorough washing, and the use of carbolic acid (1 in 20). The instruments were boiled. An antrum drill was used for trephining, by means of which a circular piece of bone (0.4 cm. in diameter) was removed, about midway between the root of the ear and the orbit, a little to one side of the median line. The emulsion was made as thick as could be drawn into a coarse hypodermic needle, and was, by means of a sterile (boiled) syringe, injected beneath the dura. The amount employed was between 0.05 and 1.0 c. c. The circle of bone removed in trephining was not replaced, but one or two silk stitches were taken in the skin cut, which was about 1.5 to 2 cm. long.

Nothing was done toward securing apposition of the periosteum, which had been cut, often by a crucial incision, and elevated by the back of a scalpel. No antiseptic was used from the time the skin was sterilized until it was stitched, when carbolic acid (five per cent solution) followed by absolute alcohol was employed, and the wound covered by sterile cotton and collodion.

The animals were marked to prevent any mistake in identification, and were then allowed to run in a large room, well lighted and ventilated, where twice a day they were inspected.

The symptoms were not recorded in certain cases from the fact that they were not noted, the animals being found dead or at the point of death. The date of death was given either at the time the

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animals were seen to die, or, where they died during the night, the time next morning at which they were discovered, was noted, no effort having been made to guess at the exact hour of death.

SYMPTOMS.

In this communication, wherever the term "usual or characteristic symptoms" is employed, some or all of the following conditions were noted, in the order given:

After a lapse of from seven to one hundred and seven days, though usually in about three weeks—

1. There was a rise of temperature (rectal) of one degree to three degrees centigrade, followed by a fall, beginning after a few hours and continuing to decrease until death; in some instances falling as low as thirty degrees centigrade.

2. Respiration was slightly increased in frequency at first, gradually becoming slower and more labored, until finally spasmodic.

3. Food and drink were refused from the onset of the first symptoms.

4. The animals, at first dull and listless, were not inclined to move unless roused, and frequently not then. In some there occurred a period of intense excitement upon irritation, preceding the paralytic stage, which occurred in all animals in which symptoms and death were observed.

5. The paralytic stage was ushered in by posterior incoördination, which was marked only when the animal attempted to move about, the hopping movement being exaggerated in one or both of the hind legs. Later there was a gradual loss of power in these extremities, and the animal either crouched with the hind legs extended far forward, or later still sprawled on the belly or side, with the hind legs extended backwards.

As the higher segments became involved, the deep muscles of the back were occasionally noticed to twitch spasmodically. The front legs gradually became affected in the same manner.

6. The head was usually drawn backward.

In a few instances the symptoms resembled somewhat those usually described in "furious" rabies, when the irritability, generally to be noted at some time during the course of the disease, seemed intensified and prolonged, almost to the time of death. In these cases there was a copious discharge of saliva and spasmodic snapping of the jaws, leading at times to a laceration of the lips or tongue.

During the temperature observations, it was ascertained that the sphincter ani gradually became relaxed as the symptoms progressed,

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so that the thermometer could be placed in position without any resistance.

POST MORTEM FINDINGS.

On opening the skull the damage done by the trephine had been completely repaired. Nothing abnormal was discernible, except perhaps an occasional slight injection of the vessels of the membranes. In two or three instances, a slight circular exudation of about 0.6—0.8 cm. was seen on the hemisphere, upon which inoculation had been made; but this gave no growth in cultures in various media, and animals inoculated from such brains died in the usual time, and after the usual symptoms and without showing the same exudation. This may have been simply the solid flocculi injected, which had collected at this point of least pressure.

The viscera were always normal with the following exceptions: The mouth, trachea, and bronchi contained mucus, and were nearly always congested, with occasional sub-mucous hemorrhages in the trachea.

The stomach was usually empty. Occasionally it contained sawdust or other extraneous materials to which the animal had access.

The bladder in nearly every case was enormously distended.

The intense rigor mortis and general reddening of the liver, mentioned by Moore and Fish,[1] was not sufficiently marked, as a rule, to attract attention.

As before mentioned, it was found that all ordinary media, inoculated from the nervous system, blood and tissues, remained sterile.

A table showing the details of experiments, as carried through two sets of animals, is appended. In the following synopsis of each case details not therein shown are given and the results of further inoculations summarized:

Case I.—Portions of two cords from rabbits, which succumbed twenty days after inoculation by Drs. Rothrock and Price, of the St. Paul health department, were used for the inoculation of rabbits 1, 2, 3 and 4. The source of the original material was from a child, which had died of rabies, so diagnosed by Dr. Sweeney of St. Paul.

The experiments were negative in result in the sixty days during which the animals were kept under observation. For the first thirty days temperature were taken twice daily, and showed no marked departure from the normal during this time. At the end of sixty days, as they remained well and had increased in weight, they were

[1] A Report on Rabies in Washington, D. C., Twelfth and Thirteenth Annual Report, Bureau of Animal Industry, 1895-96, page 271.

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used along with fresh animals in the experiments upon materials from Cases Nos. 2 and 3, and were renumbered as noted in the table. They succumbed to the reinoculations, without showing greater resistance than the other animals used at the same time.

The positive results obtained in the first series of inoculations in the St. Paul laboratory and the physician's diagnosis in the patient conflicted with these findings. It is only fair to state that the portions of the cord used for the inoculation of these rabbits (1-4) were not used immediately, but were kept in the ice chest for forty hours after the death of the St. Paul rabbits. Furthermore, later experiments served to show that sixty days is not the longest possible period of incubation.

Case II.—The cord of a rabbit, inoculated on Nov. 24, 1896, in the St. Paul city laboratory, was received and used for inoculation into rabbits 6, 7, 8 and 9. The original source of the material is shown by the following letter:

ST. PAUL, MINN., Jan. 16, 1897.

Unfortunately I can give you no history of the brown setter that you got positive results from. He was not known to have bitten, nor did he bite anyone. The owner had some one prescribe for him, and was administering pills. When I saw the dog he was dying, and his lower jaw was in a state of clonic spasms, if I may use the term to describe a clamping of the jaws, but not effecting a closure of them, the lower one being paralyzed. I at once removed him to the city laboratory, where he died almost immediately. On autopsy meningitis was evident, but no characteristic sign of rabies was discovered.

If I can obtain any history from the owner beyond the above, I will at once let you know. I should state that there was paralysis of the extremities, and a constant contraction, or rather quivering, of the muscles of the body, reminding me of some cases of strychnia poisoning I occasionally see in dogs, yet not so tonic in character.

Yours truly,

RICHARD PRICE.

P. S.—The dog was perfectly gentle to handle.

Rabbits Nos. 8 and 9 were the same as Nos. 4 and 1 respectively, used in Case I. This first series of animals, 6, 7, 8 and 9, succumbed with characteristic symptoms in twenty-one, sixteen, twenty and twenty days respectively.

Rabbits Nos. 14 and 15 were inoculated from No. 7 and died after forty-three and forty-five days respectively. This retrogression was temporary, as shown from the fact that the virus from these animals was carried through two further generations, in which six rabbits were employed, and died with characteristic symptoms in thirteen to sixteen days. In one of the animals (No. 34) the pharynx was found to contain chewed particles of wood.

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Case III.—A spaniel bitch, the property of A. J. Douglas, Merriam Park, St. Paul, was bitten, with a number of other dogs, Nov. 30, 1896. All of the other dogs known to have been bitten were destroyed, with the exception of a small poodle, which developed rabies on the thirteenth day and was destroyed two days later. An extract of a letter from Dr. Price furnishes the history of the animal as follows:

> The Douglas dog first acted unusually December 17th, refusing food, and attacking a large mastiff. She was at once suspected, secured, and brought to me December 19th, but I noticed nothing characteristic until Thursday morning, Dec. 21, 1896, when her lower jaw dropped and she could neither eat nor drink. Howled constantly from 19th to 22d. Obedient when spoken and very gentle throughout. Died during night of Saturday, 23d. Post mortem findings: Slight redness of the pharynx and larynx, injection of the meninges.

Unfortunately, of the four rabbits inoculated with an emulsion of the cerebrum of this animal, three died within twenty-four hours from the effects of the operation. From the survivor, No. 11, which died in nineteen days, only one animal was inoculated, and it, too, died with characteristic symptoms in sixteen days. From this animal six further sets of inoculations, involving fourteen rabbits, were carried out. These died in from sixteen to twenty days, with the exception of three, one of which died in seven, and the other two in one hundred and thirty-three and one hundred and eighty-four days.

The animal which succumbed in seven days weighed only 440 grammes and received 0.4 c. c. of emulsion, while its mate, weighing 550 grammes, received 0.25 c. c. and died in sixteen days. This result is somewhat parallel, so far as length of incubation period is concerned, with the experience of others. Perhaps the first cases published were in Russia, where the rabbits are smaller than are usually employed in Paris.

The animal which died in one hundred and thirty-three days had been inoculated with 0.2 c. c. subcutaneously, and 0.2 c. c. subdurally.

The animal which died in one hundred and eighty-four days had received 0.4 c. c. of the same emulsion as in the last instance subdurally, and 0.5 c. c. subcutaneously.

These are not the only instances of a delay in the appearance of symptoms, when both subdural and subcutaneous inoculations had been given. That the animals died of true rabies is shown by the fact that two series of animals inoculated from the last case recorded, died in eighteen, twenty, seventeen, and seventeen days respectively.

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The same animal (which died in one hundred and eighty-four days), on the fifteenth day after inoculation, gave birth to eight young. These died in periods of from sixteen to nineteen days. From two of these young rabbits, which died in eighteen days, inoculations were made, without result to date of writing.

Case IV.—The history of this case is as follows: About Dec. 1, 1896, a supposedly mad dog visited the premises of Mr. Fred Streich, New Auburn, Minn., and probably bit a collie belonging to Mr. Streich, though not seen to do so. He made his escape, and was not afterwards seen.

The collie on January 4th was noted to be very excited, and bit the hand of a son of his owner, but not enough to draw blood. He was shut up, and when liberated on the following day, displayed signs of unusual playfulness, and later went into the stable and bit a heifer on the head. After that he took bread, milk and potatoes as usual. He was then tied up, but soon gnawed the rope through and acted "strangely," and was killed by a blow on the head with an axe, "to prevent his doing any more damage." The body was thrown aside, and, as the weather was extremely cold, was probably frozen within a few hours. It was left until January 26th, when the head was severed from the body and sent to this laboratory, where it was received still frozen on Jan. 27, 1897.

On examination the next day the skull was found to be fractured, and a large blood clot was found over the whole front of the head, but more to the left than the right side of the median line. This was evidently due to the blow which caused death.

Owing to the fact that the animal had been killed so long before the receipt of the head, the pieces of the medulla and cerebellum removed were not immediately used for inoculation, but after cultures were taken to test their freedom from ordinary putrefactive bacteria, were kept frozen in sterile Petri's capsules.

The cultures remaining sterile on January 31st, an emulsion of the medulla was used for inoculating rabbits Nos. 19 and 20. These died after sixteen and seventeen days respectively.

Four rabbits (two pairs) inoculated from these died in four to eighteen days. The animal dying in four days developed an abscess at the site of inoculation.

Another animal, No. 30, died in eight days, but its weight was 420 grammes, and in addition to the 0.1 c. c. of emulsion, a solid piece of medulla was placed subdurally.

From No. 30 another rabbit, No. 35, weighing 2,190 grammes, was inoculated subdurally with 0.2 c. c., and subcutaneously with 0.4 c. c. He remained alive and well to June 2d (ninety-eight days),

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when he was again inoculated with 0.2 c. c. subdurally, of an emulsion from Case No. 11, which killed controls in fourteen and fifteen days. On June 26 he was inoculated subcutaneously with 1.0 c. c., of an emulsion of the cord of a rabbit, which killed controls inoculated subdurally in eight or nine days.

He remained well after these inoculations, and is still in good condition at the present time, or two hundred and thirty-seven days after the original inoculation. The double inoculation (subdural and subcutaneous) may have produced this immunity, as it apparently produced a resistance, as already noted in the series from Case III., where death was delayed so long as one hundred and thirty-three and one hundred and eighty-four days.

It may be mentioned that neither the boy, in whom no abrasion of the skin was made by the teeth of the dog, nor the heifer, bitten in the head, developed any symptoms of rabies.

Case V.—On the morning of Feb. 12, 1897, a strange dog, much emaciated, appeared in the village of New Market, Minn. It bit two other dogs, one hog, and some chickens. The strange dog and all the animals known to have been bitten were killed, and the head of the former shipped to the laboratory by Mr. Jos. H. Baltes, acting health officer.

The head was received in a frozen condition February 13th, and examinations and inoculations made February 14th. The dog had apparently been killed by a blow over right frontal region, which caused a large hæmatoma. On opening skull, brain and membranes showed injection of vessels. From white matter of left cerebral hemisphere a portion was removed in a sterile manner, and used for inoculating rabbits Nos. 25 and 26, which died in fourteen and fifteen days respectively. From these two, two other rabbits were inoculated, each of which died in fifteen days, with characteristic symptoms. No further inoculations were made.

Case VI.—The material for experiments in this case was the cord of a rabbit which succumbed in twenty-two days after inoculation, in the St. Paul city laboratory, from the brain of a cocker spaniel which had died of rabies. Dr. Price, who brought the rabbit to the laboratory, with the request for the continuation of the series, had diagnosed the disease in the dog as mute rabies.

Two series of animals inoculated from this died in twenty and twenty, and twenty-three and sixteen, days respectively.

Case VII.—A red Irish setter, bitten on Dec. 26, 1896, by a mastiff undoubtedly mad (Dr. Price), first developed symptoms on Feb. 26, 1897, when he left home and was absent until March 1st. He then returned exhausted and went into a dark corner. The dog obeyed his owner and followed, but for twenty-four hours showed a

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preference for dark corners and solitude, and refused food and water. He was not violent at any time until a few minutes before death, in Dr. Price's infirmary, where he had been removed. At this time he snapped violently, and even after death the jaws worked convulsively for a few minutes. His respiratory efforts had been labored, and he vomited some mucus. He had apparently been violent whilst away from home also, since the teeth were found broken on post mortem examination.

Post mortem examination negative, with the exception of a congested and eroded stomach, devoid of contents.

Rabbits Nos. 39 and 40, inoculated with an emulsion of the medulla of the dog, died in twenty-five and nineteen days.

From No. 39, rabbits Nos. 61 and 62 were inoculated, which died in seventy-three and twenty-two days. No explanation has been afforded of the prolongation of the incubation period in the animal dying in seventy-three days.

One animal inoculated from No. 40 died in two days, with an abscess at the seat of inoculation.

Two rabbits inoculated *subcutaneously* from No. 62 remained well.

Case VIII.—The following letter, abstracted, will serve to give the history of the case:

Benson, Minn.

Dear Sir: I send you by express the head of a dog, which was killed here February 26, suspected of having hydrophobia. This dog was a stray, and was first seen on the morning of the 26th inst. He paid little or no attention to men, but fought with every dog that came near him, after which he started on his travels. He was in every part of the village during the day, and seems to have been constantly moving. I did not see him whilst alive, and no one seems to have suspected hydrophobia till after his death. I send, also, the stomach, which contained only hair and a dark, thin fluid.

C. O. SCOFIELD, M. D.,
Health Officer.

On the receipt of the head, March 3d, rabbits Nos. 41 and 42 were inoculated, and died after characteristic symptoms, in sixteen and thirty days respectively.

From rabbit No. 42, Nos. 66 and 67 were inoculated, which died after fourteen and twelve days.

From No. 67, two other rabbits were inoculated, one of which received 0.1 c. c. subdurally, and died in nineteen days, while the other received 0.7 c. c. subcutaneously, and is still alive (188 days).

Case IX.—The source of the material in this case was a black and tan terrier, supposed to have been bitten Feb. 8, 1897, in St. Paul, Minn. On March 5th he left home for an unusual length of time, and

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on returning acted in a strange manner, refused food, and developed a snappish disposition.

He left home again, and on the following morning, when Dr. Price was called, he found the dog, which had returned, nervous, restless, but obedient to his owner, and snapping at everything in a weak fashion. On being taken to the infirmary, the disposition to bite became worse, and, chewing his way out of a wooden cage, he attacked and bit a bitch in heat, and finally became so generally aggressive that he had to be shot. He was oblivious to pain, as shown by seizing a hot iron without apparent discomfort.

Autopsy.—With the following exceptions, the organs were normal; kidneys were waxy in appearance; stomach filled with feathers, pieces of wood and bone.

Two series of rabbits were inoculated, which died in sixteen, and fourteen and nineteen and twenty-five days.

Case X.—A stray cur which had been befriended by a messenger boy some three months before, was bitten December 26th by the same dog which bit the red Irish setter (Case VII.). He first showed symptoms on March 4th, six days later than the setter. He fought and bit about twenty dogs on the same day. A diagnosis of rabies was given by Dr. Price, who brought the head to the laboratory after death, on March 8th.

Autopsy.—Convulsive movements of masseter muscles post mortem. Stomach deeply congested at pylorus; filled with wool, hay and straw. No food in either stomach or intestines. Right kidney contained a small cyst; was congested throughout.

Other organs normal.

From an emulsion of the medulla, rabbits Nos. 48 and 49 were inoculated, and died in twenty-two and twenty-one days.

From No. 49, rabbits Nos. 64 and 65 were inoculated as follows:

No. 64, weighing 420 grammes, received 0.075 c. c. subdurally and 0.2 c. c. subcutaneously, and died in twenty-six days.

No. 65, weighing 540 grammes, received 0.05 c. c. subdurally and 0.3 c. c. subcutaneously, and died in eighty-five days.

Case XI.—The source of the material is explained in the following letter:

Mora, Minn., March 11, 1897.

Dear Sir: I sent you by express last night the head and part of the spinal cord of a pup which died the night before. The chances are that it was bitten by the dog that I sent a portion of before.[1] I think you will find this specimen all right.

D. R. BUTLER, M. D.
Health Officer.

[1]Material referred to here was unfit for inoculation on its receipt in the laboratory.

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The head of a small black and tan terrier was received in the laboratory on March 11, 1897. The brain and meninges were apparently normal.

Inoculations were made at once into rabbits Nos. 50 and 51.

No. 51 died from operation, and No. 50 died with characteristic symptoms of rabies after seventeen days.

From No. 50, only one rabbit being available, No. 63 was inoculated, and died in fourteen days.

Eight more sets of rabbits (eighteen animals) were inoculated from No. 63, making a series of ten generations in all.

These latter all died in times varying from six to fifteen days, as will be seen in the accompanying sub-table. (See page 342.)

It will be noted that subcutaneous inoculations, given synchronously with the subdural, had little or no restraining influence on the development of symptoms. Some explanation of this may perhaps be attributed to the extreme strength of this particular virus, as evidenced by the very short period of incubation, which averaged for the whole ten generations 11.4 days.

Case XII.—Since this case and Case XIII. were so intimately associated, the histories of both will be here given.

About the middle of February, 1897, there appeared on the farm of Thos. Galvin, near Maryville, Minn., a strange dog which bit the farm dog and then disappeared.

About March 5th this dog (Case XII.) became irritable, refused food, and bit two pigs, four calves and a cow. He was then shut up and died in four days after the beginning of symptoms. The body was thrown out and remained frozen until March 23d, when the head was removed and brought to the laboratory by S. D. Brimhall, V. M. D., of the veterinary department of the state board of health, who was investigating the disease in all of the animals bitten by the dog.

All of the animals bitten died after showing symptoms of furious rabies. An idea of these symptoms in the calves and cow (Case XII.), may be obtained from the following sketch, from description by owner, by Dr. Brimhall:

> The calves were restless, bellowing frequently in a strange manner; chasing chickens off their perches in the pen, then following them about, and kicking at any which came near them. Saliva dripped from their mouths. They refused food and water. At times they appeared wild, and tried to get out of the windows of the pen. Whilst walking about, they frequently fell flat on the side, in an apparent convulsion.
>
> The cow refused food; showed signs of pain; trembling, sweating, pawing, pushing her nose into the bottom of the manger, and against the post of her stall, snorting and grunting. She fell down frequently and got up with difficulty.

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SUB-TABLE OF LAST EIGHT SETS OF INOCULATIONS OF CASE XI.

	Rabbit No.	Source of Material Inoculated.	Weight of Rabbit.	Dose Inoculated Subcutaneously.	Dose Inoculated Subdurally.	Time Between Inoculation and Death.	Remarks.
Third generation.	70	Medulla of rabbit No. 63.	2,010 grams.		0.3c.c.	11 days.	
	71	Medulla of rabbit No. 63.	2,110 grams.		0.3c.c.	13 days.	
Fourth generation.	79	Medulla of rabbit No. 70.	1,300 grams.		0.2c.c.	14 days.	
	80	Medulla of rabbit No. 70.	750 grams.		0.2c.c.	12 days.	
Fifth generation.	83	Medulla of rabbit No. 79.	2,050 grams.		0.2c.c.	12 days.	
	84	Medulla of rabbit No. 79.	1,940 grams.		0.2c.c.	9 days.	
Sixth generation.	87	Medulla of rabbit No. 84.	1,130 grams.		0.2c.c.	10 days.	
	88	Medulla of rabbit No. 84.	1,222 grams.	0.5c.c.		16 days.	Strength of the virus shown by production of symptoms, and death in 16 days after subcutaneous inoculation above.
	89	Medulla of rabbit No. 83.	1,610 grams.	*0.5 c.c.	0.2c.c.	12 days.	Perhaps a slight protection by double inoculation.
	90	Medulla of rabbit No. 83.	1,006 grams.			6 days.	Further evidence of intensity of the virus. Note that in later series inoculated from this animal there was a return to a longer incubation period.
Seventh generation.	91	Medulla of rabbit No. 90.	450 grams.	0.5c.c.	0.075 c.c.	7½ days.	No protection afforded by double inoculation.
	92	Medulla of rabbit No. 90.	400 grams.		0.2c.c.	7 days.	
Eighth generation.	93	Medulla of rabbit No. 91.	510 grams.	0.2c.c.	0.2c.c.	14 days.	No protection afforded by double inoculation.
	94	Medulla of rabbit No. 91.	590 grams.		0.2c.c.	15 days.	
Ninth generation.	95	Medulla of rabbit No. 93.	710 grams.	0.5c.c.	0.2c.c.	10 days.	Little or no protection afforded by double inoculation.
	96	Medulla of rabbit No. 93.	650 grams.		0.2c.c.	9 days.	
Tenth generation.	99	Medulla of rabbit No. 96.	570 grams.		0.2c.c.		Accidentally killed by carpenters while making repairs in animal room.
	102	Medulla of rabbit No. 95.	810 grams.		0.3c.c.	8 days.	

*Eight days after original inoculations, No. 89 received a second subcutaneous inoculation of 1.0 c.c. of the emulsion of the medulla of rabbit of No. 84.

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Autopsy of Cow.—"The animal had been dead sixteen hours, frozen only externally, brain soft but not congested, lungs very dark, congested, with bad odor, digestive tract normal, liver yellowish, friable, spleen dark, friable, but not enlarged."

The medulla and pons were brought to the laboratory by Dr. Brimhall, March 24th, and a portion taken from the interior furnished material of Case XII.

Rabbits Nos. 57 and 58 were inoculated on the same day, and died after showing typical symptoms in fifteen and twenty days respectively. From No. 57, rabbits Nos. 68 and 69 were inoculated, and died after eighteen and fifty-one days.

Case XIII.—The farm dog (see history under Case XII.), which was the cause of rabies in the farm animals, was the source of material in this case. The head of the dog, which had remained frozen for two weeks, was received in the laboratory on March 24th. Nothing worthy of mention was observed in the frozen head. Inoculation material removed from medulla and thawed in the incubator, was extremely bloody.

Rabbits Nos. 59 and 60 were inoculated therefrom, and died after typical symptoms, in eighteen and twenty days respectively.

Case XIV.—An Irish water spaniel, bitten two weeks previously by a supposedly rabid dog in St. Paul, Minn., showed symptoms simulating furious rabies, and was shot by Dr. Price, who brought to date (one hundred and eighty-six days), except No. 75, which was used for another experiment on September 1, 1897.

Rabbits Nos. 74, 75 and 76 were inoculated; the first two subdurally, and the last subcutaneously. They remained alive and well to date (186 days), except No. 75, which was used for another experiment on September 1, 1897.

A diagnosis of "not rabies" was given. This was the only case up to date in which the laboratory diagnosis differed from that of Dr. Price.

Case XV.—This was another dog which belonged to the same series as Case VIII., and came from Dr. Scofield, health officer of Mora, Minn. There appears to have been a small epidemic of the disease, as yet another has since been reported, in which the dog died some two weeks before this case was reported to Dr. Scofield. The animal was kept in quarantine for five days, and died on April 22, after typical symptoms, when the head was sent to the laboratory and arrived April 24. The brain appeared to be normal, but a growth of diplococci was obtained from it. It was used, however, for inoculating rabbits Nos. 81 and 82, which died in one hundred and seven and fifteen days respectively. From these rabbits two

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other pairs were inoculated, and died in seventeen and eighteen and sixteen and twenty-three days respectively. No growths of bacteria were obtained from the dead rabbits, and no explanation is afforded of the delay in the appearance of symptoms in No. 81. In two sets of animals (four rabbits), inoculated subsequently from this rabbit, the incubation period varied from sixteen to twenty-one days. Similar prolonged incubation periods have been noted by Pasteur and many later observers.

Case XVI.—A small brown dog, from Minneapolis, Minn., in which no history of a previous bite was obtainable, on July 8, 1897, ran away from home and returned acting in a strange manner and refused food. He was taken to the infirmary of the city veterinarian, Dr. Chas. E. Cotton, on July 11th, at which time his lower jaw was paralyzed, tongue protruded, and he was unable to swallow. "He had the characteristic rabid bark." He died July 13th.

Autopsy.—"General condition good, jaw dropped, tongue between teeth, larynx contained small amount of tenacious mucus. Stomach contained about 120 c. c. of a semi-fluid mass. All other organs appeared normal."

Two rabbits, Nos. 103 and 104, were inoculated and died in sixteen and twenty-two days.

From No. 103 were inoculated rabbits Nos. 112 and 113, former of which died in seventeen days, and the latter was killed accidentally by carpenters, whilst repairing animal room, ten days after inoculation.

Case XVII.—The direct source of this material was a rabbit, concerning which the following facts were obtained from Dr. Price:

On June 30th a black and tan terrier from St. Paul, Minn., was brought to the infirmary with paralysis of the lower jaw. No definite history was obtainable. Some two months before this the animal had returned home bitten.

The rabbit was inoculated at 6 p. m., the same day, and began to show symptoms on the 20th of July, and was brought to this laboratory by Dr. Price on the 22d, still displaying symptoms indicative of rabies, and died on the 24th of July. An emulsion of its medulla was employed for the inoculation of rabbits Nos. 110 and 111. No. 111 is still alive and well. No. 110 died after forty-four days, and from it two others, Nos. 130 and 131, were inoculated, of which the former died in twenty-four days and the latter succumbed to the operation, and was found dead the next day. This was an extremely unsatisfactory series of rabbits, and through an oversight further inoculations were not carried out, so that the diagnosis is still in doubt, though the findings in Dr. Price's rabbit and in Nos.

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110 and 130 would point to rabies. The fact that No. 111 did not succumb, and the prolongation of the incubation period in 110, are the only factors which render a positive diagnosis doubtful.

Case XVII.—A black and tan terrier, belonging to a gentleman in Minneapolis, Minn., was noticed on July 24th to snap and bite at the shoes of members of the family.

"He showed no aversion to water and had no characteristic bark." The head and neck of the animal, which died on July 28th, were brought to the laboratory by Dr. H. N. Avery, commissioner of health for the city, on the next day. Beyond a slight injection of the vessels of the pia, nothing abnormal was to be seen in brain, medulla and upper part of cord. Dr. Cotton, city veterinarian, in whose sanatorium the dog died, reported that nothing abnormal was to be observed in the rest of the body, post mortem, excepting a stomach "empty of food and containing pieces of gunny sack, some of which were six inches square."

Two days after receipt of the material, which had been kept meantime on ice, an emulsion of the medulla was inoculated into rabbits Nos. 114 and 115, which both died in eighteen days, with the usual negative post mortem findings.

From rabbit No. 114, two others, Nos. 122 and 123, were inoculated, one of which died in twenty-nine days, when the animal's liver was found to be full of coccidia. No. 123 is still alive and well (sixty-three days later). Unfortunately no weight can be attached to the second set in the series of inoculations, though the first would under ordinary circumstances be considered sufficient for a positive diagnosis.

Case XIX.—The head of a spaniel dog was received on Aug. 13, 1897, from Dr. Price of St. Paul. Examination of the brain showed nothing further than a congestion of the membranes. The dog belonged to a gentleman in St. Paul, but no definite previous history could be obtained.

Rabbits Nos. 120 and 121 were inoculated with an emulsion of portions of the medulla on August 13th, and died in eighteen and twenty-four days.

Rabbits Nos. 132 and 133 were inoculated on September 6th. No. 132 died from the operation. No. 133 died in sixteen days. From No. 133, rabbits Nos. 136 and 137 were inoculated, and these both died in fifteen days.

Case XX.—The body of a brown and white spaniel dog was received from Dr. H. N. Avery, Minneapolis, on Sept. 14, 1896. The dog died September 13th, after symptoms vaguely described by his owner.

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These did not suggest rabies, except perhaps in the matter of twice running away from home, and later whilst under surveillance, gnawing through a rope twice to escape, but death being unexplained, and considerable fear in the neighborhood being evinced, the case was investigated.

Autopsy.—General condition good. Left lung deeply congested and did not float in water. Stomach contained hair and bones. Kidneys slightly congested at cortex. Left ureter dilated. Brain, medulla and membranes showed nothing abnormal.

Inoculations were made on receipt of animal in the laboratory, into rabbits Nos. 134 and 135, the former of which died in seventeen days, after some very peculiar symptoms. The animal revolved at intervals, and held his head on one side constantly. There was evidence of acute congestion in the meninges, but absence of any record of bacterial findings, and of a detailed record as to which side of the brain was most affected, prevents a certain knowledge as to the cause of symptoms and death. Both animals inoculated from this rabbit died on the day after operation, and no effort was made toward further inoculations at such an extremely busy time, since it was believed, firstly, that No. 134 had not exhibited symptoms of rabies, and, secondly, if so, his mate, No. 135, would in a few days furnish material for an extension of the series. No. 135 is, however, alive at the present time (thirty-six days after inoculation). No certain diagnosis can yet be given.

DIAGNOSIS.

At the present day, as new facts following in the wake of new methods are brought to light, more than a cursory clinical examination is demanded in cases of rabies, occurring either in man or the lower animals. Even those more or less skeptical of the existence of the disease, in criticising the reduction of the death rate by the Pasteur treatment, refuse to accept the statistics of cure in cases other than those where rabies has been demonstrated in the animal biting the patient, by means of animal inoculation.

The diagnoses, then, in these first twenty cases of suspected rabies reported from this laboratory, are of interest in that they show a very large percentage of positive results, and indicate an accuracy in clinical diagnosis, judged by the laboratory findings, which is surprising.

Rabies was diagnosed in cases Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 18 and 19. Not rabies was given as the diagnosis in case No. 14.

In Case I. the four rabbits inoculated showed no symptoms in

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sixty days, which would point to the probability of the disease not being rabies. In the light of later investigations, in which occasionally long incubation periods have been observed, the animals inoculated would now be kept under observation for a longer time.

In Case XX., owing to the short time which has elapsed since inoculation, it is also impossible to give a diagnosis, although each day renders positive results less likely.

In Case XVII. it would seem better to be guarded in expressing an opinion, although the symptoms and death of the rabbit inoculated by Dr. Price, together with one death in each of two sets subsequently inoculated therefrom, would tend to the belief that the disease was rabies.

Comparatively frequent deaths (14 in 144) of the inoculated animals from the operation or sepsis, in the foregoing experiments would seem to render it highly desirable to make the test on two or more animals, for at least the first few cases examined.

This high percentage is perhaps to be attributed to the fact that a straight hypodermic needle, instead of a curved one, has been used in all the cases thus far examined, and an ordinary antrum drill, instead of a trephine specially designed for speed and safety, such as is used in Paris.

The liability of injuring the brain with these somewhat clumsy instruments is perhaps as much to be blamed for these results, as inexperience.

SHORT INCUBATION PERIODS.

In Case IV. one rabbit of 440 grammes weight received 0.4 c. c. of the emulsion of the medulla, together with a small, solid portion, and died in eight days, while its mate, which weighed 550 grammes and received a dose of 0.25 c. c., died in sixteen days.

In Case XI. (see sub-table, page 342), one animal died in six, two in seven, one in eight, two in nine, and two in ten days after inoculation, the average of 11.4 days for a series of ten generations of twenty-one rabbits, showing a virus of extreme strength.

The fact that, throughout, the rabbits used have always been much smaller, and frequently younger, than those used in Paris, would seem to satisfactorily explain these short periods of incubation, as similar experiences have been encountered in Russia. and rcognized as compatible with a diagnosis of rabies by Pasteur.

The specially strong nature of the virus of Case XL seems to have been evidenced by the period of incubation in the dog from which the material was obtained for inoculation, although nothing absolutely accurate could be obtained as to when and where it was bitten. (See letter from Dr. Butler in notes of the case.) It has

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been pointed out by de Blasi and Russo Travali,[1] that it is possible to produce death in six days regularly in rabbits and dogs by one preliminary passage through the cat, so that death can be produced in six days by rabies in rabbits.

Taking into consideration the probable period of incubation (two weeks) in the dog (Case XI.), and the absence of knowledge as to the history of the succession of animals, bitten and biting, through which the disease came, and the uniformly short incubation period throughout the whole series of rabbits, there can be no doubt of the diagnosis of rabies.

The comparatively large doses given in the experiments here reported must also be considered in this connection. In none of the animals in any case inoculated directly from the specimen sent in for diagnosis was the incubation period shorter than fourteen days.

LONG INCUBATION PERIODS.

It has been noted by many observers that occasionally a very long time may elapse after the subdural inoculation of an emulsion of the medulla or cord, from an undoubted case of rabies into rabbits, before symptoms may appear. This variability in the length of the period of incubation is very common, too, in the men or animals bitten by rabid animals.

Notably amongst delays in the appearance of symptoms after subdural inoculation of rabid material might be mentioned those occurring in the experience of Helmann, director of the St. Petersburg laboratory, and mentioned in Pasteur's letter to Duclaux, which appears in the first volume of *Les Annales de l' Institut Pasteur.* Two cases are reported in which one hundred and six and one hundred and ninety-seven days elapsed between the time of inoculation and the onset of symptoms in the first case, according to the text those of furious rabies.

In the experiments here reported, the following instances of a prolongation of the time elapsing between subdural inoculation and death might be given:

Case II.—Rabbit No. 15 (see table) died in forty-five days. It must be noted, however, that two other rabbits inoculated from this same animal, both died in thirteen days in the third set of inoculations in the series, while in the first set of four rabbits the virus taken after passage through one rabbit from the mad dog, killed in sixteen to twenty days.

[1] La Rage Experimental Chez le Chat. Annales de l' Institut Pasteur, 1894, p. 338.

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Case VII.—Rabbit No. 61 died in twenty-three days. Its mate died in twenty-two days.

Case XV.—Rabbit No. 81 died in one hundred and seven days, but a series of two generations of four rabbits inoculated from it died in from sixteen to twenty-one days.

Case XVII.—Rabbit No. 110 died in forty-four days. In this case the diagnosis is perhaps not certainly rabies, since the companion rabbit No. 111 did not die, though in the next set inoculated from No. 110 death occurred in twenty-four days.

SUBCUTANEOUS INOCULATIONS.

In very few cases was this method tried, and the results were usually negative, as will be seen from the table. A synopsis of the results is as follows:

Case VII.—From rabbit No. 62 in the second generation of the series, which died in twenty-two days, two animals received 0.2 and 0.1 c. c. of the emulsion of the medulla subcutaneously, on April 21, 1897, and are still under observation (one hundred and sixty-one days later).

Case VIII.—From rabbit No. 67, second generation of series) which died in nineteen days, a rabbit was injected subcutaneously with 0.7 c. c. of an emulsion of the medulla on April 14, 1897, and is still alive (one hundred and sixty-eight days later). Its mate, which received 0.11 c. c. of the same material subdurally, died in nineteen days.

Case XI.—From the medulla of rabbit No. 84 in the fifth generation of the series, which had died in nine days, rabbit No. 86 was injected with 0.5 c. c. subcutaneously, and died in sixteen days. His mate (No. 87), which received a subdural inoculation of 0.2 c. c. of the same emulsion, died in ten days.

It will be seen, then, that subcutaneous inoculation alone, in the four instances reported, produced symptoms and death only in one case (XI.), in which the virus was very strong.

SIMULTANEOUS SUBDURAL AND SUBCUTANEOUS INOCULATIONS.

The results obtained by this method were far from constant, and may be summarized in the following table:

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[1]Since writing the above an interesting article by Kraïouchkine, "Sur l' effet des injections souscoutanées du virus fixe de la rage (Archives des science biologique, etc. St. Petersburg, Tome V. No. 2 et 3)," has been reviewed in Centralblatt für Bakt, Parasit. und Infect. XXII, Bd., page 424.

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SUB-TABLE SHOWING COMPARATIVE LENGTHS OF INCUBATION PERIODS AFTER DOUBLE INOCULATION.

SOURCE OF MATERIAL.	Rabbit Number.	Weight of Rabbit (Grammes).	Dose Subdural (c.c.)	Dose Subcutaneous (c.c.)	Days Between Inoculation and Death.	REMARKS.
Case ii, Rabbit No. 7 (1st generation in series), which died in 16 days.	14	545	0.15	*0.6	43	Mate weighing 775 grammes, received 0.7 c.c. of same material and died in 45 days. *Subcutaneous dose in this case was given into the scalp and over face.
Case iii, Rabbit No. 23 (4th generation in series), which died in 19 days.	36	1,530	0.2	0.2	133	
Case iii, Rabbit No. 23 (4th generation in series), which died in 19 days.	43	1,670	0.4	0.5	184	Two further generations inoculated subdurally from this animal, died in 18 and 20 and 17 and 17 days respectively. So that it undoubtedly died of rabies.
Case v, Rabbit No. 25 (1st generation in series), which died in 10 days.	44	1,800	0.3	0.2	15	The cord was kept in ice-box for 4 days after rabbit No. 25 died, before inoculation into No. 44.
Case v, Rabbit No. 26 (1st generation in series), which died in 15 days.	45	1,340	0.3	0.5	15	The cord was kept in ice-box for 3 days after No. 26 died, before inoculation into No. 45.
Case iv, Rabbit No. 30 (2d generation in series), which died in 8 days.	35	2,170	0.2	0.4	did not die.	This rabbit was shown to be immune by inoculation some three months later subdurally with rabies virus, which killed its mates in 14 and 15 days. A large subcutaneous dose, given later, was also without effect. Alive and apparently well 237 days after inoculation.
Case viii, Rabbit No. 42 (1st generation in series), which died in 30 days.	66	470	0.075	0.2	14	

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SUB-TABLE SHOWING COMPARATIVE LENGTHS OF INCUBATION PERIODS AFTER DOUBLE INOCULATION.

SOURCE OF MATERIAL.	Rabbit Number.	Weight of Rabbit (Grammes).	Dose Subdural. (c.c.)	Dose Subcutaneous. (c.c.)	Days Between Inoculation and Death.	REMARKS.
Case viii, Rabbit No. 42 (1st generation in series), which died in 30 days.	67	not recorded	0.75	0.2	12	From this animal two rabbits were inoculated, one with 0.1 c.c. subdurally which killed it in 19 days, and the other with 0.7 subcutaneously, and is still alive after 186 days.
Case x, Rabbit No. 49 (1st generation in series), which died in 21 days.	64	420	0.075	0.2	26	
Case x, Rabbit No. 49 (1st generation in series), which died in 21 days.	65	540	0.05	0.3	85	As many coccidia were found in the liver post-mortem, and animals subsequently inoculated from this animal did not die, it is doubtful whether death was due to rabies.
Case xi, Rabbit No. 83 (5th generation in series), which died in 12 days.	89	1,222	0.2	0.5	12	Mate weighing 1,600 grammes died after an equal dose subdurally in 6 days.
Case xi, Rabbit No. 90 (6th generation in series), which died in 6 days.	91	450	0.075	0.5	7½	Mate weighing 400 grammes received 0.2 c.c. of same emulsion and died in 7 days.
Case xi, Rabbit No. 91 (7th generation in series), which died in 7½ days.	93	510	0.2	0.2	14	Mate weighing 590 grammes received same dose subdurally and died in 15 days.
Case xi, Rabbit No. 93 (8th generation in series), which died in 14 days.	95	710	0.2	0.5	10	Mate weighing 650 grammes received same subdural dose and died in 9 days.
Case xv, Rabbit No. 124 (3d generation in series), which died in 21 days.	127	1,520	0.1	0.5	25	Mate weighing 1,720 grammes received 0.2 c.c. of same emulsion subdurally, and is still alive (33 days later).

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As will be seen, so far as comparison is possible in these results, the double inoculation was—

(1) Apparently without effect on the duration of the period of incubation in six animals (Nos. 44, 45, 64, 67 and 91).

(2) To have caused, if anything, an increased rapidity of onset of symptoms in three animals (Nos. 14, 93 and 127).

(3) To have caused a delay in the development of the disease in six animals, which was:

a. Only slightly marked in Nos. 89 and 95.

b. Very marked in Nos. 65, 36 and 43.

c. And probably resulted in immunity in No. 35.

As the size of the dose in relation to the weight of the animals has to be taken into account, and the experiments have not been done with a fixed virus, and are as yet few in number, too much importance must not be attached to the apparent lengthening effect upon the period of incubation, produced by the double inoculation.

THE FREEZING OF THE BRAIN FOR PRESERVATION UNTIL INOCULATION CAN BE DONE.

The material in three of the cases was obtained, as will have been noted, from dogs which had been frozen for five, eighteen and twenty-two days (Cases VIII., XIII. and IV.).

In the last two the bodies of the dogs had been thrown outside and exposed to the weather from January 5th to January 26th, and from March 5th to March 28th. In several cases the material for study was received frozen, or was frozen during investigation in order to preserve it. This has been without apparent effect, and corroborates the experience of many other observers.

As many of the cases occur in winter, instructions are given in the circular of information sent out from this laboratory, to use this method, when possible, in the forwarding of specimens for examination.

No attempts have thus far been made to study the microscopic lesions in any of the cases, though the material has been carefully preserved from several sources in each case, in the hope of an opportunity for future investigation.

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THE RELATIONSHIP BETWEEN THE INFECTIOUS DISEASE OF ANIMALS AND OF MEN.*

BY H. M. BRACKEN, M. D.

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It is within comparatively few years that people have become interested in sanitation. It is the physician who is the leader in sanitary matters. This appears reasonable when we consider that he it is who knows best the cause of disease. It must be admitted that in taking a leading part in sanitation, the physician is certainly displaying a spirit of unselfishness, for good sanitary methods mean a diminution in the amount of sickness, and, of course, less business for the doctor.

The careful study of infectious diseases among animals, from the sanitary standpoint, is of more recent date than that of infectious diseases among men. Here there is an incentive to sanitation that is not generally recognized in dealing with the lives of human beings, viz., the financial side. We may talk of the cash value of a human life when discussing the ravages of infectious diseases, but this counts for little in actual practice. If a person dies from an infectious disease, the sentimental side, not the financial side, is uppermost. Providence is charged up with the death, be the negligence and culpability of man ever so pronounced.

When an infectious disease breaks out among animals, every one is interested. Dollars and cents are involved. Sentimentality and Providence are not thought of. The authorities for the suppression of such diseases are at once telegraphed to, and if the animals die, the authorities are held responsible for the fact, no matter how negligent the owner may have been in any attempt to exclude the disease from his premises.

We start out, then, with these two prominent points before us, in considering the infectious diseases of men and of animals, viz., the sentimental and the financial side.

We often find the responsibilities of caring for the infectious diseases of men and animals resting upon two distinct bodies—the state boards of health and a state veterinarian. This is a mistake. The state board of health should have control of all infectious diseases. The suppression of infectious diseases of animals involves

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two interests, (1) protection of human life, (2) protection of property. Protection of human life comes into line because so many of the diseases of animals are communicable to man. Who, for instance, should be most interested in suppressing bovine tuberculosis, a state veterinarian or a state board of health? Naturally, the latter. The former is interested only in the financial side, the latter is interested in both the financial and the humanitarian side. It is interested, not only in the lives of the cattle, but in the products obtainable from such,—milk, butter, meat,—for these products may readily convey the disease to human beings.

Fortunately, the state board of health of Minnesota has control of both the infectious diseases of men and of animals. I will say fortunately with one proviso, viz., if the legislators can be convinced of the fact and give the proper financial support. At present the infectious diseases of animals are a millstone around the neck of the state board of health, for without financial aid it is impossible to do much toward the suppression of these diseases, and the ill repute coming upon the board for not doing that which is absolutely beyond its power, with the limited means at its control, injures the board in all its undertakings. What can a paltry few thousand dollars do when it comes to dealing with a disease that is annually destroying millions of dollars worth of stock? Yet such are the ravages of hog cholera alone in this state now. One million dollars can be charged up against it this year, and this is but one disease that we have to deal with.

Let us take up, *seriatim*, the diseases that may be transmitted from animals to men. First and foremost should be considered tuberculosis. There can be no question as to the possibility of human beings becoming infected from cattle. The farmer who cares for the cows, the child or adult who uses the milk or the products of the milk, those who eat the meat of tuberculosis animals, all are in danger. What is being done to arrest this danger? Very little at present. Unfortunately, the symptoms of bovine tuberculosis are not so marked and distressing as they are in the tuberculous human being, otherwise the humane societies would come to our aid and insist upon the tubercular animal being relieved from its misery. A cow may be unfit for use as a milker or as a meat producer, and yet be used as both. We have in tuberculin a very positive test as to the existence of bovine tuberculosis. Supposing we are so fortunate as to live in a neighborhood where the milk supply is protected by compelling the dairymen to have their cows subjected to the tuberculin test? What happens then? Certain cows fail to pass the test, and nine times out of ten some one eats the meat of such con-

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demned animals. The owner objects to the financial loss of his cow that would follow if it were to be killed and its carcass condemned, so he sells it to some butcher. Some one will say at once that in order to protect the people such an animal should be paid for by the state and then destroyed. The reply to this must be in the negative. It has been tried in states and found impracticable. Bovine tuberculosis has obtained such a footing that it would be an unbearable expense to the state to pay for such condemned animals. Beside, if such paternalism were established to protect the farmer against loss through bovine tuberculosis, where would it end? He would also seek protection against every other infectious disease among animals that it might be desirable to suppress, such as glanders, hog cholera, rabies, anthrax, chicken cholera, etc. The state would soon go into bankruptcy with such a policy. Supposing such a policy were adopted, however, and the state paid the bills for all these losses, where, may I ask, does the state get the money to pay with? From the taxpayers. Thus the careful farmer would pay into the state treasury his hard earned money in order that some careless farmer might receive compensation for the fruits of his carelessness.

There is another reason beyond that of preventing infection of human beings for suppressing tuberculosis among cattle, viz., the interests of the owner. Suppose that a herd of cattle was tested with tuberculin and certain ones were found infected, which way would the interests of the owner lead him? To keep the infected cattle or to destroy them? Most certainly to destroy them, otherwise the whole herd would be liable to infection and the ultimate loss would be much greater than that which would follow the immediate destruction of the few.

Again, who is responsible for the existence of tuberculosis in a herd of cattle? Undoubtedly the owner, although unintentionally. He buys cows without determining before the purchase the presence or absence of tuberculosis. He buys cows that have been inbred for the sake of producing good milkers, although in so doing a low grade of vitality follows. He keeps the cattle too closely housed in poorly ventilated or unventilated sheds or barns. In many cases he feeds his cows so as to produce the greatest amount of milk, regardless of consequence to their health. Who should suffer the consequences for such carelessness? Undoubtedly the one who has brought about the condition. Take such a position and the farmer and the dairyman will soon appreciate that it is to his interests, in every way, to exclude tuberculosis from his herd.

What should be done, then, to protect all parties from tuberculosis?

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First—The farmer or the dairyman, in his own interest, should see to it that he has no tubercular cattle on his place to begin with, and that in buying he selects only healthy animals. The tuberculin test should be his safeguard. It is put within his reach. He should see that the health of his cattle is well cared for by proper housing, feeding and breeding. All this is in his own interest.

Second—The consumer should insist on knowing that the products furnished him for consumption are free from tubercular infection. This can be accomplished so far as milk, cheese and butter are concerned, by the periodic testing of cows with tuberculin. It can be accomplished, so far as the meat supply is concerned, by insisting that all animals shall be slaughtered only where careful inspection is possible, both before and after slaughter.

At present we hear a great deal about actinomycocis, or lumpy jaw. This is an infectious disease, dependent upon a peculiar fungus known as the ray fungus. There is less danger of communicating this disease to mankind through the use of meat of infected animals than there is of conveying in food products bovine tuberculosis. Animals suffering from this disease may be slaughtered for food when the disease is local. The disease is a progressive one, however, attended by necrosis of tissue and suppuration. The disease, which generally begins in the alveolar processes of the jaw, spreads by gradual infection of adjoining parts. When infection becomes general, the meat of the animal is unfit for food. The fact that there is a stage in the disease when the meat becomes unfit for food should be a barrier against the slaughter of cattle suffering from this disease for food, unless careful inspection, both ante and post mortem, is enforced. Of course, from the cattle raiser's point of view, actinomycosis should be treated as any other infectious disease of animals. The keeping of such cattle cannot be too severely condemned. If such a practice were permitted, actinomycosis would undoubtedly soon become quite general in any neighborhood. I am sorry to say there are unscrupulous feeders in this state (and I presume in other states) who make it a business to buy up the so-called lumpy jaw cattle and put them upon the market. The profit for such feeders and for the butchers killing such animals is naturally greater than with the meat from healthy animals. Such a practice should not be tolerated, either by the farmers of the neighborhood or by the meat consumers. It is an outrage upon a community to bring this infectious disease into its midst. It is an outrage upon the meat consumers to have such meat sold to them as food. All forces should join hands in exterminating lumpy jaw cattle from the state. While the danger of conveying this disease by the consump-

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tion of such meat as food is slight, it should be borne in mind that those who handle lumpy jaw cattle run a certain risk of infection.

Another important disease communicable from animals to man is trichinosis. We do not give this enough thought. Trichinosis is probably not a frequent disease among hogs in this state that are fed in the open. We should expect it in hogs that are fed on offal at slaughter houses. It has been shown by investigation that a very large proportion of the rats about slaughter houses are infected with trichinosis. These rats, as opportunity presents itself, are killed, and their carcasses are thrown to the hogs that are kept at such a place. It is but reasonable to expect that hogs eating the carcasses of such rats shall become infected with trichinosis. Hogs fed on offal from slaughter houses do not furnish us as fine a quality of meat as the grain-fed hog, and this fact, together with the danger from trichinosis, should be sufficient reason for prohibiting piggeries in connection with slaughter houses, or the feeding of offal from slaughter houses to hogs.

At the January meeting of the Minnesota state board of health, by unanimous vote, action was taken as follows: After March 1, 1898, no hogs shall be permitted to be kept or fed at or about slaughter houses, nor shall the offal from slaughter houses be fed to hogs. These rules are established:

1. To prevent the transmission of certain infectious diseases from animals to man.

2. To prevent the spread of certain infectious diseases among animals.

3. To avoid the creation of a public nuisance.

Glanders is looked upon generally as a disease affecting horses, and yet we all know, not only that it is communicable to man, but that it is a most fatal disease in man. We have in mallein as absolute a means of protecting ourselves against harboring this disease as we have in tuberculin against tuberculosis. I have heard it stated by a competent veterinarian that, should he test a horse with mallein and secure the characteristic reaction, and afterwards find no evidence of glanders at a post mortem, he would consider himself, rather than the mallein, at fault; that the disease was present, to a very slight degree possibly, although the point of infection had been overlooked in the post mortem. On the other hand, it is stated that if the clinical symptoms resembled very closely those of glanders and the mallein test gave no reaction, one would be justified in pronouncing the case not one of glanders. The mallein test will show the existence of glanders long before there are any clinical symptoms.

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Rabies is a disease that most certainly demands our attention. There are those who say it does not exist. They are in the wrong. It is far more common among animals than we are disposed to admit. Self-protection calls for a more careful study of this disease in our efforts to guard against its becoming epidemic.

But one other disease demands our consideration at present, viz., hog cholera. It is probable that there is no danger of communicating this disease to man. We have not the same dual interest in its suppression, then, that we have in the suppression of bovine tuberculosis, of glanders and of rabies. However, while the direct communication is not probable, the meat of an infected animal is not safe for food, and precautions should be taken against the possible sale of such meat.

A fellow feeling should be sufficient to make us use every means in our power to impress upon every one the infectiousness of this disease and the methods to be used to prevent the spread of the infection. We have here a disease as fatal to the hog as Asiatic cholera is to mankind. The same means that we would take to prevent the spread of Asiatic cholera, viz., thorough quarantine and disinfection, with proper feeding, will protect the farmer against the ravages of hog cholera.

Why have I presented this paper to a body of medical men? Because medical men are interested in the suppression of disease. Because intelligent medical men can thoroughly appreciate the character of infectious diseases and the most successful methods for combatting them. It is to the medical man that we must look for the greatest influence in suppressing the infectious diseases of animals as well as of man. His interests in the healthfulness of his clients should be sufficient reason for his using every effort in his power to prevent the spread of infectious diseases of animals to man. His interests in the financial success of those about him in the country districts should be sufficient reason for using the knowledge at his command to aid in the control and suppression of infectious diseases among animals.

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SOME EXPERIMENTAL WORK WITH BOVINE TUBERCULOSIS.[1]

BY M. H. REYNOLDS, M. D., V. M.
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EXPERIMENTAL WORK WITH TUBERCULIN.

This experiment work was begun at the university farm in the fall of 1894. The experiment included eleven head of cattle of the following breeds: Three Shorthorns, two Jerseys, three Polled Angus, one Holstein, one Réd Polled and one native. They showed upon post-mortem various stages of tuberculosis. I hoped to get data that would help us to eventually answer the following questions:

1. Is tuberculin an accurate diagnostic agent?
2. Under what circumstances, if any, may a tuberculous animal fail to react?
3. Is tuberculin injurious to sound cattle?
4. Is tuberculin injurious to tuberculous cattle?
5. Has a cure, or has merely an immunity to the tuberculin, been effected in those cases in which the patient fails to react after one or more injections?
6. What is the diagnostic value of retests as compared with the first test?
7. Can a reasonably accurate estimate be made of the extent or location of the disease from evidence given by the tuberculin test?
8. Is the test reliable in the case of advanced pregnancy?
9. Has tuberculin any therapeutic value in bovine tuberculosis?

These cattle were originally divided into two groups. Those in one group were to receive small doses of tuberculin each week, and those in the other group large doses of tuberculin on alternate weeks. This was subsequently abandoned in part. The periods were continued and the doses were varied according to susceptibilities. When an animal quit reacting to any dose, the dose was increased. When an animal would no longer react to very large doses, the injections were stopped for a period of four weeks and then the maximum dose given. If no reaction followed, another period of one month was allowed to elapse, when another large dose was given. If no reaction followed this time, the animal was killed. But in case the animal gave a reaction at the end of either

[1]Read before the Minnesota Homeopathic Medical Association, May 18, 1898.

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month, several more doses were given at the regular intervals for this animal. When it again failed to react, a period of one month was allowed to elapse without injection, when the maximum dose was given and the animal post-mortemed in case no reaction appeared.

Careful records were kept of each post-mortem, and portions of organs that looked suspicious were taken for microscopic examination and for rabbit and white-rat inoculations. Three rabbits and three rats were inoculated from each subject. Injections were made through the flank. The hair was clipped, skin washed with corrosive sublimate solution, and then, after cutting up a small fold of the skin with sterilized scissors, injection was made into the peritoneal cavity through the muscle thus laid bare. The mixture used for inoculation was prepared by crushing bits of suspected tissue in sterilized water under cover. Please bear in mind that the purpose was to determine if there was present in the body any active tubercular processes, and not to determine their location. Several rabbits out of the lot used for this work were killed at different times and others died, but no tuberculosis had been found except in those used for this experimental work. The rabbits and rats were kept isolated in previously sterilized cages until post-mortemed.

The post-mortem* and pathological reports were carefully preserved for comparison with the microscopic examinations and with the original post-mortems of the cattle. In this way we had the post-mortem of the cow, the post-mortem evidence of the rabbits and rats, the microscopic examination of suspected tissues taken from the cow, and the microscopic examination of suspected tissues taken from the rabbits. The rats proved quite refractory, as was expected, and gave little evidence of importance. Post mortems of the cattle showed various stages of the disease, and degree of generalization.

The cattle had all given distinct and typical reactions under the tuberculin test, and this was taken as sufficient evidence that they were tuberculous at the beginning of the experiment. Experience has demonstrated in thousands of tests that tuberculin is wonderfully accurate; that when the tests are carefully made it does not fail in more than two to five per cent of the cases tested.

All the cattle used in this experimental work received several injections before the experiment proper began.

The experiment commenced November 5th, and continued until

*Officially done by Dr. Haggard of Minneapolis.

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October 14th, following. During the winter season the cattle were kept in a barn that was entirely too small, allowing but 640 cubic feet per cow, and the stable was also cold. They were turned out in the yard for exercise when the weather was not too severe. In general they were cheaply fed and very plainly kept. This plan was adopted partly as a matter of economy, but chiefly to avoid complicating the experiment as to the therapeutic value of the tuberculin. If the cattle had been well fed and carefully kept, and then had apparently recovered from the disease, it would have been urged with some force that the cure may have resulted from the favorable conditions of feed and care. I trust that the possibility will be borne in mind that, if these cattle had been kept under very favorable conditions, there might have been a larger percentage of recovery.

In order to make a brief study of my results, I present the following table (see p. 366), which is taken from the University of Minnesota Experiment Station Bulletin, No. 51:

In this table the cattle are divided into two groups. In one group the cattle recovered, or were evidently improved, or but very slightly diseased in the first place, but without improvement. In the second group the cattle were badly diseased, and no apparent improvement took place. Please notice that the two which apparently recovered were but slightly diseased; that they reacted but a few times and gave low reactions. It is also shown by the post-mortem records that in the case of those which recovered or made evident improvement the disease involved chiefly the thoracic organs. On the contrary, the cattle that were extensively diseased, reacted many times, and showed marked uniformity in the time when reaction appeared for each individual. For instance, Dora's Pogis continued to react on a small dose at the end of the experiment, after having been injected twenty-two times, and was evidently just as susceptible to tuberculin at the close of the experiment as at the beginning. Silver Pogis refused to react after the sixth injection, although very badly diseased. It should be borne in mind that he received large doses from the start.

EXTENT AND LOCATION OF DISEASE AS INDICATED BY THE TUBERCULIN REACTION.

The impression prevails quite generally among those who have not made a study of this subject that the height of the reaction indicates the extent of the disease; but those who have had a chance to study this work on a large scale have known from the beginning that this is not true: that an animal when slightly diseased may give a very high reaction, and is perhaps more apt to do so if in good flesh than one thin in flesh and generally diseased.

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TABLE LII. Character of Reactions, Location and Extent of Disease—Results of Treatment.

Table Summary: Two recovered, two distinctly improved, one slightly improved. Rose reacted two times—recovered. L. No. 2 reacted three times—recovered. Fancy 2d reacted four times—greatly improved. Polly reacted six times—distinctly improved.

	Name.	Number of Times Reaction Appeared at:								Total Number of Times Reacted.	First Test.		Second Test.	
		6 a. m.	8 a. m.	10 a. m.	12 m.	2 p. m.	4 p. m.	6 p. m.	8 p. m.		First Distinct Rise.	Extent of Rise.	First Distinct Rise.	Extent of Rise.
Evidently Improved or Slightly Diseased.	Rose	0	1	0	0	1	0	0	0	2	8 a. m.	2.0	0	0
	L. No. 2	2	0	0	0	1	0	0	0	3	6 a. m.	1.9	6 a. m.	3.0
	Fancy 2d	2	1	0	1	0	0	0	0	4	8 a. m.	4.2	6 a. m.	4.5
	Polly	1	3	1	1	0	0	0	0	6	6 a. m.	2.6	8 a. m.	4.0
	Bess	3	3	3	2	0	0	0	0	11	6 a. m.	3.0	6 a. m.	2.6
	Univ. Princess	0	0	1	2	1	0	0	0	4	12 m.	2.8	12 m.	1.7
Badly Diseased and no Apparent Improvement.	Dora's Pogis	5	13	1	2	0	1	0	0	22	6 a. m.	3.3	6 a. m.	2.7
	Silver Pogis	1	3	0	1	0	1	0	0	6	12 m.	2.0	6 a. m.	3.0
	Young Maiden	1	1	1	0	2	0	0	0	5	8 a. m.	4.2	6 a. m.	3.4
	Fancy	3	1	1	1	0	0	0	0	6	6 a. m.	5.6	10 a. m.	4.4
	Fancy's Bull	6	6	1	1	0	0	0	0	14	8 a. m.	4.9	6 a. m.	4.4

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TABLE LII.—*Continued.*

	NAME.	Reaction in General, High or Low.	Reaction in General, Early or Late.	Uniformity of Reaction, Time.	Disease most pronounced in	Extent of Disease.	GENERAL RESULT OF TREATMENT.
Evidently or Slightly Recovered. Improved Diseased.	Rose	Low	Irregular	0	Thorax	x	Recovered.
	L. No. 2	Low	Early	x	Thorax	x	Recovered.
	Fancy 2d	High	Early	x	Thorax	x	Greatly improved.
	Polly	Medium	Medium	xx	Thorax	xx	Many cicatrices showing improvement.
	Bess	Medium	Irregular	xx	General	xxx	A few cicatrices showing slight improvement.
	Univ. Princess	Low	Late	xx	Thorax	x	Negative.
Badly Diseased and no Apparent Improvement.	Dora's Pogis	High	Early	xxx	Abdominal but very general	xxx	Negative.
	Silver Pogis	Low	Medium	xx	General	xxxx	Negative.
	Young Maiden	Medium	Irregular	0	General	xxx	Negative.
	Fancy	High	Early	xx	Lungs, but very general	xxxx	Negative.
	Fancy's Bull	High	Early	xxx	Thorax, but general	xxx	Negative.

All injected at 10 p. m. x — slight; xx — decided; xxx — very decided or extensive. 2 degrees, low; 2 to 3, medium; 3 and over, high.

☞ The first line of this page corresponds with first line of preceding table.

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That it would be extremely desirable to secure some basis or rule upon which the extent and location of the disease might be estimated from the temperature chart goes without saying.

You must remember that, in veterinary practice, we are unable to make such accurate examination of the lungs as in human practice. The chest walls are thick, and frequently covered with heavy layers of muscle and fatty tissue, and the lungs themselves are large. I had noticed repeatedly in doing routine test-work that animals which reacted early (for instance, if injected at 10 p. m., and gave decided rise of temperature by 6 a. m. following) were quite often badly diseased, and that the disease involved especially the lungs and attached glands. In order to see if this would hold good on a larger scale, and in the hope that some rule or basis might be found upon which an estimate as to pathological conditions could be made, I have tabulated a number of tuberculin reactions and post-mortems as follows. (See p. 366.) In this table I have included only those animals which either had badly diseased lungs and attached glands, or showed a distinct rise of temperature within ten hours and a maximum rise of 3.5 degrees or more above the average normal of the previous day. This table is also taken from Experiment Station Bulletin, No. 51:

TABLE LIII.—Temperature Records as Showing Location and Extent of Disease—Lungs and Attached Glands.

Work Done by Station.

Test Number.	Name.	First Test.		Extent of Disease in Lungs and Attached Glands.	Remarks.
		Rise of Temperature.			
		First Distinct.	* Extent of.		
1	Minnie Fawn	5th hour	4.4	xxxx	
5	Dido	10th hour	5.4	x	
12	Trixy 3d	6th hour	4.5	xxx	
24	Houston 2d	6th hour	3.2	xxx	
25	Jenny	10th hour	4.1	xxx	
39	Molly	6th hour	3.5	xxx	
41	Reddie's Calf	8th hour	4.3	xx	
43	Olive's Calf	6th hour	3.4	xx	This bull had high temp. during period before injection, and was generally and very badly diseased.
45	Molly's Calf	6th hour	4.3	xxx	
49	Princess' Bull	10th hour	1.5	xxxx	
56	Big Princess	10th hour	4.4	xx	
104	Daisy	12th hour	3.2	xxx	
221		8th hour	4.4	xxx	
229		8th hour	6.	xxx	
252	Bob Tail	8th hour	1.5	xxxx	Same as No. 49.
253	Bones	No rise		xxxx	Same as No. 49.
355		10th hour	4.4	xxx	
356		8th hour	6.1	xx	
446	Wild Eyes	8th hour	3.9	xxx	
447	Madge	10th hour	3.	xxxx	
449	Alderney	10th hour	4.9	xxx	
482	Deer	10th hour	4.1	xxx	
601		8th hour	4.8	xxx	
740		8th hour	4.5	xxx	
883	May	8th hour	5.8	xx	
1045	Houston	10th hour	5.1	xxx	
1047	Ida	6th hour	5.7	x	
1051	Lou	10th hour	4.	xx	
1076	Queen	6th hour	4.1	xx	

* Maximum rise above average normal of previous day.

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There were twenty-two animals which showed a distinct rise of temperature within ten hours after injection and gave a maximum rise of 3.5 degrees or more above the average normal of the previous day, and fourteen of these showed extensive disease of the lungs and attached glands.

Conversely, a total of twenty animals showed extensive disease of the lungs and attached glands, and of these twenty, fourteen gave a distinct rise of temperature within ten hours and a maximum rise of 3.5 degrees or more above the average normal of the previous day.

Table LIV. offers a similar study of a lot of tuberculin work done at the central experiment farm, Ottawa, Canada:

TABLE LIV.

Temperature Records as Showing Location and Extent of Disease—Lungs and Attached Glands.

(From Bulletin 20, Central Experiment Farm, Ottawa, Canada.)

Name.	First Test.		Extent of Disease in Lungs and Attached Glands.
	Rise of Temperature.		
	First Distinct.	*Extent of	
Ruth	11th hour	4.3	xxxx
Lily	9th hour	4.4	xxxx
May	2d hour	3.7	xxxx
Barberry	8th hour	4.8	0
Fashion	8th hour	5.0	xxx
Elmwood Garland	9th hour	4.7	xxx
Miss Elgins	11th hour	4.8	xxx
Fanny B.	14.5 hour	3.1	xx
Countess	12.5 hour	3.0	xxxx
Aaggie Cornelia	9th hour	4.6	xx
Dorinda 2d	11th hour	3.2	xx
Lord Lincoln	10th hour	2.8	xxx
Hero	7th hour	4.2	xxxx

* Maximum rise above average normal of previous day.

Seven animals in this list showed a distinct rise of temperature within ten hours, and gave a maximum rise of 3.5 degrees or more, and of these seven, five showed extensive disease of the lungs and attached glands.

Conversely, eight animals showed extensive disease of the lungs and attached glands, and of these eight, five gave a distinct rise of temperature within ten hours and a maximum of 3.5 degrees or over.

Table LV. (page 368) shows another study of this problem in a lot of cattle tested at the state hospital for the insane, Norristown, Pa.:

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TABLE LV.

Temperature Records as Showing Location and Extent of Disease—Lungs and Attached Glands.

(From Special Report on Bovine Tuberculosis in the Herd of State Hospital for Insane, Norristown, Pa.)

Test Number.	First Test.		Extent of Disease in Lungs and Attached Glands.	Remarks.
	Rise of Temperature.			
	First Distinct.	*Extent of.		
1	10th hour	5.2	xxxx	
2	9th hour	5.2	xxxx	
3	8th hour	3.4	xxxx	Omentum xx.
4	10th hour	4.1	xxxx	
5	10th hour	5.4	xxx	
6	10th hour	5.1	x	
7	10th hour	5.2	xxx	
8	10th hour	4.2	xx	
9	10th hour	4.1	xxxx	
10	12th hour	4.0	x	
11	10th hour	4.0	xxx	
12	10th hour	4.4	x	
13	10th hour	4.2	xxxx	
14	10th hour	5.4	xxx	
15	10th hour	5.3	xxx	
16	10th hour	5.3	x	
17	10th hour	4.1	xxx	
18	10th hour	3.4	xxx	
19	10th hour	4.1	xxxx	
20	11th hour	4.0	xxxx	
21	10th hour	4.1	xxxx	
22	10th hour	4.4	xxx	
23	10th hour	3.4	xxx	
24	12th hour	4.1	xxxx	
25	10th hour	5.0	xx	
26	10th hour	5.2	0	Liver x.
27	10th hour	6.3	xxx	
28	13th hour	4.2	x	
29	10th hour	5.4	xxx	
30	10th hour	6.0	0	Intestines and mesenteric glands xx.
31	10th hour	3.3	xxx	
32	12th hour	4.4	xx	
33	11th hour	5.2	xxx	
34	10th hour	2.0	xx	Temp. 106 before injection.
35	10th hour	2.3	x	
36	10th hour	3.4	xxxx	
37	10th hour	5.1	xxx	[ly diseased. Intestines xxx.
38	10th hour	2.2	xxxx	Very generally and extensive-
39	10th hour	6.0	x	Intestines xx.
40	10th hour	5.3	x	
41	10th hour	5.2	x	
42	10th hour	5.1	xxx	
43	10th hour	4.3	xx	
44	10th hour	3.1	xxxx	
45	10th hour	6.0	xxxx	
46	10th hour	6.2	xxxx	
47	10th hour	5.3	xxx	
48	10th hour	5.0	xxxx	
49	10th hour	5.0	xxx	Lungs 0.
50	12th hour	4.0	xxx	
51	10th hour	4.4	xxx	
52	10th hour	6.0	xx	
53	12th hour	3.3	xxx	
54	10th hour	3.0	xx	
55	10th hour	4.1	0	Liver xxx.
56	10th hour	4.4	xxxx	
57	10th hour	3.4	xxxx	
58	10th hour	5.4	xxx	
59	12th hour	4.2	xxxx	
60	10th hour	4.1	xxx	
61	10th hour	4.1	xxxx	
62	10th hour	3.3	xxxx	
63	10th hour	4.2	xxx	
64	10th hour	6.0	xxx	

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TABLE LV.— *Continued.*

Test Number.	First Test.		Extent of Disease in Lungs and Attached Glands.	Remarks.
	Rise of Temperature.			
	First Distinct.	*Extent of.		
65	10th hour	3.3	xxx	
66	10th hour	6.0	xxx	
67	10th hour	5.4	xxxx	
68	10th hour	5.3	x	Liver xxx.
69	10th hour	5.0	xxx	
70	10th hour	6.0	xx	Intestines xx.
71	10th hour	6.3	xxx	
72	13th hour	4.2	xxx	
73	10th hour	5.2	xxx	
74	12th hour	4.1	xxx	
75	10th hour	6.2	xxx	
76	10th hour	4.4	xxx	
77	10th hour	5.2	xxx	
78	12th hour	4.2	xx	
79	10th hour	5.1	xxxx	
80	10th hour	4.0	xxxx	
81	10th hour	5.0	xxx	
82	11th hour	4.2	xxx	
83	10th hour	4.2	xx	
84	10th hour	5.0	xxx	
85	10th hour	4.3	xxx	
86	10th hour	4.3	xxxx	
87	10th hour	3.0	x	Lungs 0.
88	10th hour	5.4	xxx	
89	10th hour	4.2	x	Liver x.
90	12th hour	3.0	x	Intestines and Mes. Gl. xx.
91	12th hour	4.2	0	
92	12th hour	3.3	xx	
93	13th hour	3.3	x	
94	10th hour	5.0	x	
95	10th hour	3.3	xxx	
96	10th hour	4.3	xxx	
97	10th hour	4.3	xxxx	
98	10th hour	2.4	xxx	
99	10th hour	6.1	xxxx	
100	12th hour	3.0	x	Liver x.

* Maximum rise above average normal of previous day.

Of this last group a total of sixty-six animals showed a distinct rise of temperature within ten hours, and gave a maximum of 3.5 degrees or over; and of these sixty-six, forty-eight showed extensive disease of the lungs and attached glands.

Conversely, a total of sixty-nine animals showed extensive disease of the lungs and attached glands, and of these sixty-nine, forty-eight gave a distinct rise of temperature within ten hours, and a maximum rise of 3.5 degrees or over.

Summing up this study of the three herds, we find that a total of ninety-five animals showed a distinct rise of temperature within ten hours, and gave a maximum of 3.5 degrees or over, and of these ninety-five, sixty-seven showed extensive disease of the lungs and attached glands.

Conversely, a total of ninety-seven animals showed extensive disease of the lungs and attached glands, and of these ninety-seven,

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sixty-seven showed a distinct rise of temperature within ten hours, and gave a maximum of 3.5 degrees or over.

I hope to continue this study, with a view to determining, if possible, whether there is any uniformity in conditions of the animals, or circumstances of the test among the animals, that do not conform to the following, viz.: That a distinct rise of temperature within ten hours after injection, and a maximum rise of 3.5 degrees or over, indicates extensive disease of the lungs and attached glands. Of course, the proposition may not be supported when more evidence has been accumulated.

SUMMARY OF EXPERIMENTS.

The tuberculin test, although not infallible, is certainly a very accurate diagnostic for bovine tuberculosis,—so accurate as to be very practical.

Tuberculin is not injurious to the health of tuberculous cattle in doses (bureau tuberculin) varying from 2 to 4 c. c. per 1,000 pounds live weight. The latter would be a very large dose for either a diagnostic or therapeutic purpose.

Cattle sometimes fail to react after one or more injections. In such cases there may have been a cure effected, or such animals may have acquired an immunity to the tuberculin; more often the latter.

It is quite evident that an animal may remain tuberculous, and presumably infectious, after several injections of tuberculin, and yet refuse to react. It is therefore plain that the diagnostic value of retests is much less than that of the original test.

About seventy per cent of the cattle presented in Tables LIII., LIV. and LV. having extensive disease of the lungs and attached glands, gave a distinct rise of temperature within ten hours and a maximum of 3.5 degrees or over.

Conversely, about seventy per cent of those that gave a distinct rise of temperature within ten hours and a maximum of 3.5 degrees or over showed extensive disease of the lungs and attached glands, bureau tuberculin being used in doses of 1 c. c. per 500 pounds live weight. Allow me to suggest in this connection that it has been frequently noticed by others, and such has been my experience, that animals which are very extensively diseased, particularly if the lesions are of long standing, quite often give low reactions or none at all.

The tuberculin test is not objectionable in advanced pregnancies, except that it is then less reliable.

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It is evident that tuberculin may be curative in certain cases of recent infection or where the lesions are limited in extent, and it apparently increases the tendency toward recovery in other cases. Two cases made evident recovery out of eleven treated; two others showed marked evidence of recent repair in diseased tissues. The conditions of feed, care, etc., preclude any probability that these results were due to the conditions of care and feed.

I may also report, in this connection, that Drs. Niles and Stalker of the Iowa Experiment Station report a case of a grade Shorthorn cow, which received a number of tuberculin injections and finally failed to react, even after large doses, and no evidence of active tuberculosis could be found on post-mortem. Dr. De Schweinitz of the government bureau of animal industry reports the case of an animal which received a total of 3,000 c. c. tuberculin during a long period, and plainly recovered from the disease.

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THE EXPERIMENT STATION VETERINARIAN AS A MEMBER OF THE STATE BOARD OF HEALTH.[1]

BY M. H. REYNOLDS, M. D., V. M.

Director Veterinary Department Minnesota State Board of Health and Veterinarian Minnesota Experiment Station.

It is unfortunate that there is not greater uniformity in methods of controlling infectious diseases among domestic animals. Some states have adopted the plan of a state veterinarian, assisted by local deputies, the state veterinarian having little or no connection with the state board of health, while other states are trying to control infectious diseases among domestic animals through boards of live stock commissioners. Some states have a state veterinarian working on a very meagre salary; others have state veterinarians who are non-graduates, but who are given considerable authority, while still others are trying to control these diseases by means of official titles, i. e., they have officers and titles, but these officers are practically without funds and without sufficient authority.

In Minnesota all police authority concerning infectious diseases of animals is vested in the state board of health. Until Jan. 1, 1897, this board was composed exclusively of physicians. For a great many years Minnesota's state board of health presented the strange combination of a board composed exclusively of practitioners of human medicine having absolute authority in all cases concerning infectious diseases of domestic animals. During this time the gentleman who held the position of experiment station veterinarian was expected to visit outbreaks and accomplish marvelous things in the way of checking infectious diseases—without any authority. This situation, and the results of this method, did not prove satisfactory to our stock interests, and the governor decided to appoint a veterinarian to membership on the state board of health. The experiment station veterinarian was appointed to the place, and this is the present situation in our state.

The newly appointed member of the state board of health was soon made chairman of the committee on infectious diseases of animals, and, later, director of a veterinary department, and given charge of the correspondence and general office work pertaining to infectious diseases of domestic animals. The work of the board is now divided into three parts: that of the secretary and general executive officer, the bacteriological laboratory under the charge of a director, and the veterinary department, also under the charge of

[1]Read before the United States Experiment Station Veterinary Association, Omaha, September, 1898.

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a director. Rules which define the duties and authority of the director of the veterinary department have been adopted as follows:

1. The director of the veterinary department shall have the privilege of proposing such circulars and rules as he may deem necessary for the purpose of defining the policy of the board with reference to the veterinary work of the board. Such circulars and rules shall be submitted to the executive committee or to the state board of health for approval.

2. The director shall conduct the correspondence dealing exclusively with veterinary matters. He shall have the necessary police authority to enable him to order quarantine, when in his judgment such course shall become necessary. He shall have authority to use his judgment in releasing quarantine in unusual cases, independent of the rules governing quarantine.

3. All agents and employes doing veterinary work in the field shall report to the director, and it shall be the duty of the director to furnish the secretary with such summaries of regular work and with such other information as the secretary may need, in order that he may keep fully informed concerning the work.

4. It shall be the duty of the director to refer such matters as violation of the law dealing with infectious diseases of animals, general enforcement of said law, and indifference and carelessness of local health officers to the secretary for action.

5. It shall be the duty of the field veterinarian to investigate outbreaks of infectious diseases among domestic animals, when deemed advisable by the director of the veterinary department, and to attend to such experimental and other veterinary work as may seem necessary. When not doing field work, it shall be his duty to assist the director in correspondence and other office work.

6. The field veterinarian shall have authority to order quarantine, to kill and release quarantine of domestic animals, in accordance with the rules and recognized methods of the state board of health.

7. It is hereby declared the policy of the state board to pay the salary and furnish transportation for the field veterinarian. Local boards are expected to pay all his other legitimate expenses incurred in the work for them.

The work of the veterinary department has grown rapidly in all directions. During 1897 the board employed one field veterinarian. Last spring it employed a second. Thus you see we have one veterinarian as a member of the state board of health and two others engaged in the field work of the board. One of these field veterinarians has devoted his entire time to hog cholera; the other has been doing miscellaneous work, going to outbreaks of any disease of unusual importance, to outbreaks where there is dispute among different veterinarians who have been called by owners and local boards, and to places in the state where there are no competent veterinarians.

Perhaps I should explain that, in Minnesota, we expect the local board of health to employ a local veterinarian in ordinary cases, and to take care of their own outbreaks of infectious diseases among

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domestic animals under the direction of the state board. The law requires that local health officers shall report to the state board of health within twenty-four hours after receiving information of an infectious disease.

During the four years of my work as an experiment station veterinarian, before my connection with the state board of health, I was constantly crippled for lack of police authority. An experiment station veterinarian is usually expected to visit outbreaks, make diagnoses, and write prescriptions, and then he is severely blamed because the outbreak of glanders or anthrax, or possibly sheep scab, does not promptly abate.

On the other hand, the state board of health veterinarian or state veterinarian, as the case may be, who has no connection with an experiment station, is very apt to be crippled for lack of opportunities and funds for investigation. For instance, he visits an outbreak of disease that affords a peculiar and unusual history. The trouble may be due to faulty conditions of the food, but he is unable to make a careful investigation and gather satisfactory information as to the cause and nature of the trouble, perhaps for lack of funds for such work.

An experiment station veterinarian, who is also a state board of health veterinarian or state veterinarian, has excellent opportunities for collecting material, for doing a great variety of experimental work, and keeping accurate records, and all this with very little additional expense to the station. This is especially true if he has access to a well equipped bacteriological laboratory.

Another advantage in combining the office of experiment station and state veterinarian is that it brings about a hearty coöperation between two great institutions which might otherwise be working separately and more or less fruitlessly in the same field, each one's work incomplete, without the data which the other could furnish.

In Minnesota we have found coöperation between the veterinary work of the experiment station and of the state board of health to be satisfactory, just as we found the work unsatisfactory before such combination was made. So long as we had one authority in the state who had charge of infectious diseases of animals, and another who was working along the lines of both infectious and non-infectious diseases but had no police authority by which he could control infectious diseases, the work for each outbreak was very unsatisfactory.

Owing to the way in which the work is organized in Minnesota, outbreaks of infectious diseases among domestic animals should be discovered and reported by the local health officer to the state board.

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Correspondence and other office work of the veterinary department of the two institutions can be greatly economized by coöperation. There is needed only one set of office records and one official head for the two departments. Although there may be a large correspondence and an immense amount of office records and files to look after, the work can be so planned that one office assistant does the work.

Let me say in conclusion, that I hope the work of this association may aid in bringing about greater uniformity and closer cooperation between the various states, and that, when this work is organized as it should be, the veterinary profession will be represented on every state board of health.

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STATE CONTROL OF HOG CHOLERA.[1]

BY M. H. REYNOLDS, M. D., V. M.

Director Veterinary Department, Minnesota State Board of Health, Veterinarian Minnesota Experiment Station.

It has been quite generally accepted among state authorities who are working with infectious diseases of animals that hog cholera was just hog cholera, and that there was no use in attempting to restrain it through state control. Such lethargy is not justifiable, and state authorities who are not making an organized and aggressive fight against hog cholera are not doing their full duty. It is common to hear from other states the excuse, "We have no such law back of us as you have in Minnesota." The remedy for this is a simple one. Get such a law from your next legislature. I am fully aware that the hog cholera question is a serious one. I am also aware, from a personal experience in a long struggle, that it is a difficult one to deal with, but I must insist that it is both possible and practical to quarantine and control the disease.

My discussion of this problem must necessarily bear largely on Minnesota methods, for, so far as I know, Minnesota is the only state that has made any definite, organized attempt to control extensive outbreaks of this disease.

Minnesota has a state board of health composed of eight physicians and one veterinarian, and under the control of this board are about 1,840 local boards of health. In country districts the township board of supervisors constitute the local board of health. The work of the state board of health is carried on through three departments, the executive, the bacteriological laboratory and the veterinary department.

Reports of infectious disease among animals should be made first to the local board of health, and by it to the veterinary department of the state board within twenty-four hours. The local board must take immediate action looking to the control of infectious diseases within its jurisdiction. It must employ its own veterinarian and pay its own bills. It may make rules for its guidance, but the rules of any local board cannot displace the rules of the state board.

The Minnesota law makes it the duty of any person who knows of or has reason to suspect the existence of any infectious disease among domestic animals to report the fact immediately to a local board of health, and provides penalties for disobedience. The state

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[1]Read at the thirty-fifth annual meeting of the United States Veterinary Association, Omaha, September, 1898.

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board has authority to order the killing of any domestic animal that has been exposed to any infectious disease. It may also examine, or cause to be examined, under oath, through its agents, any person believed to have knowledge concerning the existence of any infectious disease among domestic animals. It specifies that the carcasses of swine that have died from any disease must be buried properly or burned. It prohibits the selling or giving away of the carcasses of swine that have died of, or been killed on account of, any disease. It prohibits the conveyance of sick swine along any public highway or on public or private grounds, other than those of the owner. It prohibits the allowing of sick hogs to run at large.

CAMPAIGN AGAINST HOG CHOLERA IN MINNESOTA IN 1897.

No systematic attempt had been made in Minnesota, looking to the control of hog cholera, until 1897. At that time there were probably forty-one infected counties in the state. The first effort of the board was naturally directed to the education of local officials and of the farmers themselves. Local papers took an active part in this educational campaign. Circulars describing the disease were scattered broadcast throughout the infected territory and contiguous portions of the state. The farmers' institutes assisted us in bringing the subject before the people.

It was the aim of the state board to deal with this infectious disease as it would with an infectious disease among men, viz., through careful quarantine. This was carried on by districts as well as by individual quarantine. Fifteen counties badly infected in 1896 were placed under general quarantine regulations, but this did not prevent our carrying on individual farm quarantine also throughout this district. Individual farm quarantine was insisted upon in all parts of the state where the disease appeared for the first time in 1897. In many instances the disease did not spread beyond the locality in which it first appeared. Quarantine is applied only to the sick and exposed hogs and the pens and yards in which they have been quartered, not to the whole farm. Quarantine cards are posted in conspicuous places on these infected premises, and these cards read as follows:

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MINNESOTA STATE BOARD OF HEALTH.

HOG CHOLERA!

EXISTS ON THESE PREMISES.

All persons, excepting the owner, duly authorized attendants, or medical advisers, are forbidden to enter any enclosures where hogs are kept on these premises, until this card has been removed by permission from the State or Local Board of Health.

Hogs must not be removed from these premises after date of this card, until six months after the last case of suspicious swine disease has died or recovered, except in the following cases: 1st, by permission in writing given by the State Board of Health; and 2d, dressed carcasses of healthy hogs killed under inspection of the State or Local Board of Health.

No hogs, excepting those hereby quarantined and their offspring shall be allowed upon these premises until six months after the last hog has died or recovered. During this period of six months no other domestic animal shall be permitted in these pens for any reason whatever.

Parties living on this place must not go near pens or yards where hogs are kept on other farms.

Keepers of these hogs will be held responsible for the unauthorized removal of this notice, and for allowing any swine hereby quarantined to escape from these pens or yards and run at large.

By Order of

Dated_____ 18____ _____ Health Officer.

CHAPTER 233, LAWS OF 1897.

Sec. 9. Any person violating any provision of this act or any rule or regulation made by the State Board of Health, or by any Local Board of Health, or any order made by any such board under the authority hereof, shall be guilty of a misdemeanor and be punished by a fine of not less than twenty-five (25) or more than one hundred (100) dollars, or by imprisonment for not less than thirty (30) or more than ninety (90) days.

Perhaps someone is already saying, "But do you really consider individual farm quarantine for hog cholera a practical thing in extensive outbreaks?" I do consider such individual farm quarantine entirely practical in recent and limited outbreaks. It can be made successful in extensive outbreaks, providing the chairmen of township boards are active and willing to do their work faithfully and in spite of opposition, and provided further that these boards of supervisors have the support of their influential and intelligent farmers.

We have been able to find such conditions in Minnesota quite frequently, but there have been exceptions. I do not suppose for a moment that this work is ideal, and yet we have accomplished results that have been fairly satisfactory to ourselves and to the stock interests of the state. When farmers are generally convinced that hog cholera is an infectious disease, and are better informed concerning it, and when township supervisors are better informed concerning their duties, our work will be easier and more satisfactory.

It is quite reasonable to suppose that in the near future we will be provided with a vaccine that can be economically produced, conveniently administered, and thoroughly practical. When this happy day arrives, we will have means that can be used to great advantage in connection with such quarantine as has been outlined

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in this paper. If an outbreak appears on a certain farm all hogs on the neighboring farms for several miles can be promptly vaccinated. In this way we will not only have all the safeguards that may come from quarantine, but we will also be able to "back fire," as it were, against the disease.

Besides the quarantine card the board issues a "trespass" card which reads as follows:

FOR USE BY OWNERS OF HOGS.

NOTICE!

ALL UNAUTHORIZED PERSONS ARE FORBIDDEN, UNDER PENALTY OF THE LAW, TO APPROACH ON THESE PREMISES, NEARER THAN 50 FEET TO ANY PENS OR YARDS WHERE HOGS ARE CONFINED.

Signature of Owner.

CHAPTER 233, LAWS OF 1897.

Section 11. Whenever during the prevalence in the state of any contagious or infectious disease among domestic animals, the owner shall post on his premises a notice forbidding all persons not authorized by State or Local Boards of Health to enter any building or enclosure on said premises without permission from said owner, it shall be a misdemeanor to enter upon said premises, punishable by a fine of not less than twenty-five dollars ($25) nor more than one hundred dollars ($100), or by imprisonment for not less than thirty (30) nor more than ninety (90) days.

This is for the use of those whose hogs are not affected, warning people to keep away from their pens. Farmers are using these protective cards more this season than last, for they are beginning to appreciate the advantage to be derived from their warnings.

For general correspondence a "stock" letter, such as the following, is used:

It is the duty of local health officers, including township supervisors, to quarantine all yards and pens in which there has recently been any suspicious swine disease. Conditions of quarantine are given on the "Hog Cholera" and "Suspicious Swine Disease" card, sent you under separate cover.

I send you to-day a complete hog cholera file, containing several copies of the blank for reporting infectious diseases among domestic animals. Please fill out one of these for each farm whereon the disease has appeared, and return to me as soon as possible. It is your duty to put up in a conspicuous place one or more of the "Hog Cholera" and "Suspicious Swine Disease"

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cards, bearing in mind that you are quarantining only the yards, pens, etc., where hogs have been confined. Please distribute copies of the law and hog cholera circulars freely in this neighborhood. I think it would be wise for you to read the hog cholera circulars and law carefully, that you may give the neighbors such advice as they need. Call their attention especially to the last section of the law, and see that it is enforced.

The "Notice" cards should be distributed among neighbors whose hogs have not been sick, and who may wish to avail themselves of the protection which the law gives them; that is, the right to issue private quarantine in self-defense.

Neighbors should be warned of the presence of the disease, and informed that it is very unwise for them to go where sick hogs have been kept on other farms, and equally dangerous to permit visiting neighbors to go into hog pens or yards.

I hope your people will realize that hog cholera is infectious, like smallpox or diphtheria, and must be conveyed from farm to farm, otherwise it does not spread.

The fact that there has been no sickness during the past few weeks among hogs on a farm where there has recently been an infectious swine disease gives no assurance of safety. The farm may still be infectious, and should be so regarded. It may be necessary for you to watch this thing closely for several months. It is folly to waste valuable time in discussing the name of the disease that is now prevailing in your township. The name is the least important feature; but if it is infectious, i. e., catching, it is hog cholera, and must be treated as such. Very respectfully, M. H. REYNOLDS,

Some space is left at the top of this letter for the insertion of any special instructions. The letters are printed with copying ink and typewriter type. By using such a "stock" letter a great deal of clerical work is saved.

The following regulations are in force as relating to hog cholera:

HOG CHOLERA REGULATIONS.

All railroad shipping pens in the following counties are hereby declared to be probable or possible sources of infection for hog cholera: Fillmore, Mower, Freeborn, Faribault, Martin, Jackson, Nobles, Rock, Pipestone, Murray, Cottonwood, Watonwan, Blue Earth, Waseca, Steele, Dodge, Olmsted, Winona, Dakota, Scott, Sibley, Renville, Yellow Medicine, Lac qui Parle, Chippewa, Kandiyohi, McLeod, Carver, Anoka, Stearns, Pope, Swift, Rice, Le Sueur, Nicollet, Brown, Redwood, Lyon, Lincoln, Meeker, Wright, Washington, Wabasha, Houston and Goodhue.

1. Hogs must not be removed from any railroad shipping pen located within the aforesaid counties except for immediate shipment by rail to some point for slaughter.

2. Hogs shipped from point to point in Minnesota, or from another state into Minnesota, and not intended for immediate slaughter or for exhibition at the state fair, must be crated, shipped in other than stock cars, and accompanied by a certificate stating that they were free from disease when shipped, and that there had been no hog cholera in the neighborhood from which they were shipped for a period of at least six months previous to the shipment.

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This certificate must be signed by a licensed physician, veterinarian or health officer, and must be delivered to the local health officer of the district into which the hogs are shipped.

3. Hogs for shipment in crates must not be permitted in, or loaded from, stockyards.

4. Hogs intended for exhibition at the state fair must be shipped in cars that have never carried hogs, or in stock cars that have been disinfected by the railroad, according to agreement with the state board of health. They must be shipped in crates, and must not be loaded from or through any railroad shipping pens. Upon arrival at the fair grounds, the person in charge will be required to show a clean bill of health, as designated above, before the hogs are unloaded.

Managers of county and district fairs held in any of the counties named above are requested not to have swine exhibits in connection with such fairs during 1898.

By order of the state board of health. H. M. BRACKEN, M. D.,
Secretary.

The state board had two veterinarians in the field during the hog cholera season. The work of these men is partly educational partly executive, partly professional. Their educational work has been particularly valuable during the season of 1898. In carrying this out the veterinarian goes from township to township, and talks individually with the members of the local board of health concerning their duties and the importance of fulfilling them.

STATE AND COUNTY FAIRS.

Swine exhibits at the state and county fairs have furnished us a difficult problem.

Some of the conditions imposed last year were plainly impractical, and our plans for 1898 were arranged so as to avoid these points. Ten days before the state fair opened, general freight agents were furnished with a complete list of all intending swine exhibitors, and they then provided sufficient horse cars or new stock cars, or stock cars that had been disinfected by means of steam, for this special work. Each freight train passing through places from which swine shipments were to be made carried two such cars on Thursday, Friday and Saturday before the fair. Upon arrival at the fair grounds each exhibitor was required to sign a certificate to the effect that his hogs were free from disease when shipped and came from neighborhood in which there had been no suspicious swine disease during the past six months. All hogs were inspected on their arrival by a representative of the state board of health, and thereafter daily during the fair.

Pens at the fair grounds had been so arranged that visitors could not climb into them, and an extra partition, made tight, has been

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placed between them so that there could be no possibility of manure or litter or other infectious material being transferred from one pen to another.

A small circular was issued to exhibitors, and through the general offices to the local railroad agents, informing them of the conditions that had been imposed. This circular also informed exhibitors of the precautions that have been taken for their good. Our rules provided further that, if daily inspection discovered any sick hogs, such hogs would be isolated in pens especially provided. If the disease proved to be hog cholera, the sick hogs would be killed and the carcasses properly disposed of.

I have been furnished with a list of exhibitors, and all swine exhibitors will be followed to their homes by correspondence, that we may know how well our work succeeded.

At the larger stock yards, for instance South St. Paul and New Brighton, where federal government inspection is maintained, we coöperate with the federal government by giving the government inspectors authority to act also as representatives of the state board of health. This plan has proven very satisfactory. The following blank, when filled out by such representatives of the bureau and state board of health, gives needed information as to the place from which such diseased stock was shipped, township in which they were fed, etc. Thus it is possible to trace diseased animals back to the township from which they came:

Minnesota State Board of Health.

Report of Diseased Animals at.....Stock Yards.
Disease .....
Point of shipment.....
Number and kind of animals.....
Fed by .....
Fed in township of.....
Consignor .....
Consignee .....
Number diseased animals.....
Disposition of diseased animals.....
Remarks: .....
.....
.....

Signed,.....
Inspector.

Note.—Please report promptly in duplicate to the veterinary department of the Minnesota state board of health.

The hog cholera situation in Minnesota up to the present date (Aug. 15, 1898,) is much more encouraging this year than last.

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Comparatively few outbreaks have appeared, although I take it for granted that there will be plenty of trouble during September and October, when stock buyers and threshing crews are moving about in the country and farmers have commenced fall feeding. I have no means of knowing just what relation exists between hog cholera and conditions of food and care, but I have a lingering suspicion that when the hog cholera chapter is finally written there will be something other than bacilli in it.

For the benefit of our Iowa and Nebraska friends, I will state that practically all of our trouble with hog cholera has come from these two states, and the disease has been generally distributed by railroads.

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SUPPLEMENT

TO THE

SEVENTEENTH REPORT

OF THE

STATE BOARD OF HEALTH

AND VITAL STATISTICS

OF MINNESOTA.

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QUARTERLY REPORT

OF THE

SECRETARY AND EXECUTIVE OFFICER.

Dec. 31, 1898.

This report, in addition to the usual topics pertaining to the work of the board, contains a summary for the year of various data that has been collected and tabulated in this office.

DIPHTHERIA.

You will remember that at our last quarterly meeting your secretary was instructed to investigate the removal of quarantine in a case of diphtheria at Albert Lea, before the time limit set by the state board at its meeting April 12, 1898, and to take such action as he might deem best. Investigation showed the facts to be as follows: On September 19th Dr. Nissen informed me by letter that Dr. B. was not following out the rules of the state board of health governing the quarantine of diphtheria, viz., a four-weeks' time limit, or two negative reports from the bacteriological laboratory, as to the presence of the *bacillus diphtheriae*. I wrote to Dr. B., September 22d, as follows:

Last spring Dr. Nissen informed this board of your action in reversing his diagnosis on a case of diphtheria, and refusing to quarantine same. The board recognized the fact that you had exceeded your authority, and that Dr. Nissen had a perfect right to take action at law against you.

To-day I have complaint again from Dr. Nissen regarding too early removal of a quarantine card from the house of one of his patients. He also relates that, in an adjoining house, where you had a patient ill with diphtheria, you permitted two grown-up sisters to remove from the house, and continue, one in school, the other at her business. Let me draw your attention to certain facts:

1. The quarantine of diphtheria is, by a recent rule of the state board of health, set at *four weeks*, as a time limit, or *two negative* bacteriological reports. Sometimes the bacteriological regulation requires less than four weeks' quarantine, sometimes more.

2. With regard to releasing people from quarantine, and allowing them to continue at their regular duties, this may be permitted, provided the individual is made safe by thorough disinfection and change of clothing, and *provided* their occupation does not bring them into close contact with people, especially children. No one should be allowed to go from an infected house and continue uninterruptedly at school. There should be no return to school

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until the period of incubation for the disease in case should have been passed. The student that removed from the house of your patient should not have been allowed to continue in school without an interval of at least one week, in order to remove all possible conveyance of contagion.

3. I have had no report of diphtheria from Albert Lea. Please note the inclosed marked copy of the law.

Pardon me, doctor, when I say I think you need to be a little more stringent in your efforts to control infectious diseases, and it is also a dangerous practice for you to place your diagnosis above that of the attending physician, so long as he is on the safe side. Of course, if a physician states that a case is not an infectious disease when you think it probably is, you have a right to investigate and satisfy yourself; but if a physician has asked you to establish quarantine, you should do so, and maintain quarantine so long as the rules of the state or local board of health requires.

To this Dr. B. replied, September 24th, stating that the case referred to was still in quarantine, and that quarantine would be maintained according to the rules of the state board of health.

On September 27th Dr. Nissen informed me by letter that quarantine had been removed from the house of Mrs. Blacklin September 24th. This was sixteen days only since quarantine had been established at this place, and the same day that Dr. B. wrote me that quarantine was still being maintained. There seemed to be but one interpretation to put upon this action of Dr B., viz., that he did not intend to enforce the rules of the state board of health. It seemed necessary, therefore, to begin suit against Dr. B. In order to do this I went to Albert Lea October 14th, and again the 21st. The trial in the justice court was held November 11th and 13th, before Justice Robert S. Clements, and the case was lost on a technically weak point in the evidence against the defendant.

It is an undisputed fact that there has been a great deal of indifference manifested in the quarantine and care of diphtheria at Albert Lea. Early in November the public schools were closed. On November 10th and 11th two deaths occurred in a district where infection had become quite general. There were in all, from September to Dec. 31, 1898, thirty-two cases. Of these, two died. I trust Albert Lea has learned a lesson by this experience.

Maple Plain had in October a mild epidemic of sore throat in the public school. Diphtheria was not suspected until a physician called from Delano pronounced its presence in the patient he was called to see. His diagnosis was confirmed by the laboratory findings. A culture was taken from the nose of another child that had been ill in the village, and this, too, showed the presence of *b. diphtheriae.* The acting health officer, a layman, took hold of the matter energetically. Four families were quarantined at once. The school

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was closed for two weeks. Later some of the quarantined families were determined to submit to restraint no longer, so, at the request of the acting health officer, Mr. Budd, I visited the place, October 23d, and took cultures from nine individuals, representing four families. Five of these cultures gave the *b. diphtheriae*. On October 29th Dr. Wilson went to Maple Plain, and again took cultures from those whom I had examined. He also took cultures from the throats of other members of the families who had not been sick. As a result, three families were still kept in quarantine. Later other cultures were taken from these three families by the chairman of the board of supervisors, Mr. Budd, and again by Dr. Wilson. Quarantine was finally released on negative bacteriological findings. No new cases have occurred in this place. This is one of the demonstrations of the results of careful quarantine, and Mr. Budd deserves much credit for the manner in which he carried out his part of the work.

October 27th, at the urgent request of Dr. Hulburd, health officer, I visited Morris, Minn. Dr. Hulburd had been contending that certain cases of sore throat were diphtheria, and had quarantined such cases in his own practice. Other physicians contended that the sore throats referred to were not due to diphtheria, and they refused to report the cases. Of twelve cultures taken by me eleven showed the presence of *bacillus diphtheriae*, thus fully establishing Dr. Hulburd's position. Following this general negligence of the Morris physicians it became necessary to close the schools, and the town has been going through all the privileges which accompany an epidemic of diphtheria, an epidemic that might have been easily prevented had the trouble been properly reported at the outset. The most marked case of those examined by me was a young lady, a teacher in the public school. When I saw her she had been confined to the house about a week. Her physician insisted that she did not have diphtheria. Examination the morning of October 28th showed a typical case of diphtheria, easily diagnosed clinically. It is worthy of note that several of the sick children were from the schoolroom of this teacher. None of the "sore-throat" cases except those of Dr. Hulburd had been quarantined. The disease is still present, but no longer as an epidemic, there being only an occasional case now.

Dr. Hulburd has given me the following history of this epidemic:

In August, we think, a family had diphtheria without medical attendance. On September 11th the disease appeared in two families. Two more cases appeared the latter part of the month, making, for September, four cases in

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four families. In October there were eleven cases in ten families; in November, eleven cases in ten families; in December, four cases in four families. No new cases since December 9th. Three adults had the disease in a severe form. The schools were closed from September 24th to October 4th, and from October 29th to November 8th. The state bacteriological laboratory rendered valuable diagnostic aid.

There was thus a total of thirty cases, with one death.

December 3d I visited Crookston, at the request of Dr. Loe, because of the possibility of an epidemic of diphtheria. A man had gone to Crookston from Hallock, November 25th. He was admitted to a hospital the same evening, and was first seen by the attending physician the next morning, November 26th. The diagnosis of diphtheria was made, and every precaution taken to prevent the spread of the disease. Prophylactic doses of antitoxine were used quite liberally. Patients were removed from the hospital. The hospital was thoroughly disinfected. The room in which the patient had been kept was painted thoroughly after fumigation—walls and floor. One little child who showed symptoms of sore throat, and her mother, were promptly quarantined in a special building provided by the city, under the direction of its health officer, Dr. Dunlop. In fact, the whole system of quarantine was as thorough as would have been caried out had smallpox appeared in the place.

I have gone into the details of this case thus fully because of its being in such strong contrast with the action of such places as Morris, Albert Lea, etc., when diphtheria appeared in their midst. The contrasts in results, too, were striking, for instead of having an epidemic on its hands, that required the closing of schools, etc., Crookston escaped without other cases of diphtheria.

In connection with the state school at Owatonna, after a trip made by Dr. Wesbrook, October 28th, it seemed advisable for this board, in connection with the superintendent, Mr. Merrill, and the attending physician, Dr. Adair, to give this matter very careful consideration. As a result, Mr. Merrill, Dr. Adair, Dr. Wesbrook, Dr. Hutchinson and myself met at this office the evening of November 5th, and arrived at the following conclusions:

That a thorough system of isolation and quarantine should be carried out for each child. In order to do this, the hospital building should be thoroughly disinfected, and separate rooms arranged for each child in process of quarantine. The plan adopted was to have three places for housing the children of the school:

1. The place in which the infected children were to be kept.
2. The "filter" or house in which the children would be kept while passing through the process of inspection.

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3. The places to which the "filtered" children should go as released from quarantine.

The plan was entered into most willingly by all interested in the control of the school, in order, if possible, to eliminate diphtheria from the school. A description of the methods of examination, etc., will probably be given you by Dr. Wesbrook in his report.

On December 15th I visited Owatonna, in order that I might learn more fully the condition of that city and the state public school in their relation to diphtheria. The special reason for my visit was to learn more of the result of a suggestion made by Dr. Wesbrook, that the children of the public school of Owatonna should be examined culturally, in order to determine whether they were in the same condition as the children at the state public school located in the outskirts of the city. Under Dr. Adair's supervision, thirty-five cultures were taken from the nose and thirty-eight cultures from the throat of children in the public school. Of these, twenty-five of the nose cultures (seventy-one per cent) and twenty of the throat cultures (fifty-two per cent) showed the presence of the *b. diphtheriae* or *b. Owatonnae.* It is worthy of note that but two specimens, one from the nose and one from the throat showed the typical bacillus of diphtheria. With these facts presented, it seemed well to carry investigations further. A neighboring town was visited by Dr. Adair, and fifty-two cultures each were taken from the noses and throats of children in the high and ward schools, with the following results: Twenty-three from the nose and twelve from the throat showed the *bacillus diphtheriae* present, twenty-eight from the nose and thirty-three from the throat were free from this bacillus, six from the throat were questionable, while one from the throat had but scant growth and one from the nose had no growth.

Here, again, however, there were but two cultures with *typical bacillus diphtheriae.* It may be interesting, in connection with these findings, to note a report of 175 school children examined in Minneapolis in December. Of these, 170 showed no *bacillus diphtheriae* present, four in whom the *bacillus diphtheriae* were present had had sore throat, and one other, in whose culture was found the *b. diphtheriae*, was from a family in which there had been two cases of clinical diphtheria.

In 1896-97 there was quite an epidemic of diphtheria at Wadena. In December, 1896, Dr. McKinnon sent a culture from a Wadena patient to the laboratory for examination. The *b. diphtheriae* was present, and the fact was reported to the health officer, as well as to Dr. McKinnon. The latter recognized his duty as a physician

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and as a citizen, but did not have the support of the health officer. Still further, there was at least one physician beside the health officer who insisted that the sore throats that his patients were having were only tonsillitis, and this in spite of the laboratory findings. Things went from bad to worse at Wadena, until Nov. 22, 1897, when the mayor wrote me for advice, etc. I gave him a statement of the facts, and what might be expected if these were ignored. Thinking the superintendent of schools would be interested in protecting the healthy school children, I wrote to him as follows:

There is diphtheria in your place. I learn that a great deal of indifference and negligence is shown, both on the part of the householders and of one or more doctors in your place. With this state of things, I must urge you to pursue the course followed in some of our eastern cities, viz., to have the throats of all the children of your schools examined at least twice a week. If there are any evidences of sore throat, even though very slight, smears should be taken and a bacteriological report given. Any child having the germs of *diphtheriæ* in the throat should be excluded from school until two negative microscopic reports are given as to their presence. I am aware that you are having the disease in a mild form, but this is no excuse for carelessness or negligence. If your people will not recognize the necessity for such care, it is the duty of your school board to protect children in school from exposure to this disease after the manner I have suggested. I am told that not all of the cases where there has been a bacteriological diagnosis of diphtheria have been quarantined. I can hardly believe this.

My letter was never acknowledged, nor was my advice heeded. The reason given for this was stated to be the fear that, should parents know the facts, they would keep their children out of school. Affairs drifted along, several of those who should have used their influence to control the spread of the disease taking much the course of the proverbial ostrich, which hides its head in the sand and imagines itself free from the danger that it can no longer see. Finally the school attendance dwindled down to so small a proportion of what it should have been that the schools were closed. In the end, Wadena had an experience for which she paid dearly, and as there is a lesson to be learned from all this, I give here a letter, describing the facts fully, from Dr. A. Thompson, the present health officer:

I will endeavor to comply with your request for a history of the epidemic and reappearances of diphtheria as it occurred in Wadena. The council elected me health officer in March of the present year (1898), prior to which probably no record was kept of when a house was put under quarantine restrictions, and many cases were never reported to the health officer.

About Nov. 22, 1896, a child named Schreiner, residing in this village, was taken ill. A Mrs. Tarno, from Hewitt, was sent for to attend it. There being

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no improvement, Dr. B. was called. He said it was croup. The child getting worse, he had consultation with Dr. Morell, of Verndale. Death resulted Nov. 30, 1896; recorded cause, "true croup." On or about the same time, a child in the Golz family, next door, was sick with sore throat. Dr. B. attended it. Death resulted, and cause was assigned as "croup." In both of these cases public funerals were held, one or both from the church, and I think the other children continued to attend public school.

Next to get sick, Dec. 1, 1896, was a child named King. She had been present at one of the funerals. Dr. B. was called. He said she had tonsillitis, but the school board, feeling solicitous concerning the fatality of the "new disease," as some of the people began to designate it, requested to have Dr. McKinnon and myself investigate. We did so, diagnosing diphtheria; sent a culture specimen to the state laboratory, and received back answer that it was as we had said. The village school was then ordered closed for two weeks. Maybury's child died May 14, 1897. Cause of its death was reported to the health officer as "croup."

No more diphtheria developed until about Sept. 1, 1897, when it appeared simultaneously in the families of Wandrie and Shearer. Prompt quarantine was applied to the first named, but, as Dr. B. was attending Shearer's, a diagnosis of diphtheria was not made until the disease had existed over a week, when Dr. McKinnon was requested to attend. The boy died. The other Shearer children were allowed to attend church and the public school.

Following this, diphtheria spread all over Wadena, resulting in a general epidemic, and continued about four months. Quarantine was imperfectly observed, and the law was not enforced against anyone who did not choose to notify the board of health.

Among the families who suffered at this period were Gores, attended by Dr. B., with assigned cause of death, as "membranous croup;" also Moellers (4), Loewer (2), Biggs, Kraemer, Wagner (3), William Mettal, Schmidt, Wrights (2), and a Miss Braum.

The village school closed again, this time for a period of six weeks, by order of the trustees, and it was about this date you visited Wadena to officially investigate the progress of the disease. Jan. 11, 1898, I find the name of Elsie Kallusky, a child recorded as having died of "throat trouble." From that date there was a suspension of diphtheria until, May 12, 1898, John Rockney consulted Dr. B. for sore throat. He gave him medicine. The man continued ill ten days at home, when I was requested to come to his house. There I found his child Clara suffering from advanced diphtheritic laryngitis. It was given two thousand units of antitoxine, but died in forty-eight hours. A baby in the same family contracted the disease, and, after receiving a third injection of antitoxine, it recovered. Smears from the throats were submitted to, and the diagnosis confirmed by the state bacteriological department. Mrs. Pratt, who resided in an adjoining part of the house, moved out with her child as soon as informed of the situation. However, she contracted the disease, and, after two weeks' illness, recovered. A girl named Beach died June 23, 1898, and her brother recovered. The disease also attacked the families of Buckley and Newman.

The last to have diphtheria in Wadena were Mark Green and his wife. Smears were forwarded by me July 11th, and weekly thereafter, until Aug. 26, 1898, when Professor Wesbrook declared them free from *bacillus diph-*

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theriæ. An infant in this family escaped infection, as did also one in the Beach, Loewer and Pratt families, respectively.

It appears to me the Schreiner patient, on her return from a visit to Hewitt, Minn., was the *fons et origo* of the epidemic here, as it subsequently developed in a number of households near them, and, without precautionary measures, it was widely extended through school and churches.

At one residence last year I observed a placard tacked up for several days with the vague warning, "Suspected diphtheria," upon it. Probably seventy-five cases occurred here, with twenty-five deaths. In 1897 the maximum attendance at school was 400 children, but as soon as the presence of diphtheria became known the number decreased to 300.

My practice has been to promptly quarantine and personally superintend fumigation; if a child from an infected house is attending school, to notify the principal; to investigate so-called "croup" when it comes to my knowledge; to rely implicitly upon the state laboratory, and early resort to the use of antitoxine.

Very truly yours,

A. THOMPSON.

The law says: "Sec. 18. (It) shall be the duty of all local boards of health, whenever they are informed that there is a case of smallpox, scarlet fever, diphtheria, or other infectious or contagious disease, within the territory over which it has jurisdiction, to immediately examine into the facts of the case, and if the disease appears to be of the character above specified, they shall adopt such quarantine and sanitary measures as may in their judgment tend to prevent the spread of said disease in its locality, subject to be modified by the state board of health, and shall immediately notify the secretary of the said state board of the appearance of such disease and the measures adopted by said local board in relation thereto." But there seems to have been little regard paid to these instructions in the past two years. I have been receiving clippings from all the papers throughout the state on topics relating to sanitation. The following table for 1898 (to December 1st) will demonstrate, to some extent, the importance of these clippings:

	Outbreaks First Reported by Health Officer.	Outbreaks First Learned of Through Newspapers.	Total Outbreaks Reported.	Total Cases Known of by State Board of Health.
Diphtheria	177	63	240	1,329
Scarlet fever	53	3	56	547

This table is not given to demonstrate the prevalence of these diseases nor the accuracy of statistics, but rather to draw attention to the fact that such diseases do exist. The conditions as pertaining to diphtheria are extremely annoying and dangerous. There is a general tendency to try to conceal the existence of the disease by giving it some other name. There is no excuse for such action. It

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is better to err on the safe side. It would be much safer to call all sore throats diphtheria at the outset, to be confirmed or denied by a bacteriological diagnosis, than to call diphtheria a simple tonsillitis. It does no harm to quietly warn a family when one of its members has a sore throat that the disease, though mild, may be diphtheria; that a mild case of diphtheria is as dangerous, so far as infection is concerned, as the more severe clinical forms; even more so; that the diagnosis can usually be cleared up positively in a few hours if a microscopical examination is made; that, for the sake of other members of the family and of the public at large, *all* sore throats should be isolated until a microscopical examination is made of suspected secretions from the mucous membrane.

There is a tendency indulged in by many physicians, as well as by the laity, to consider the patient as having recovered from diphtheria as soon as the clinical symptoms, notably the diphtheritic membrane, have disappeared. This is a most dangerous course to pursue. A patient may, to all appearances, have recovered fully, and yet be a most dangerous individual in a community. So long as the bacilli of diphtheria are present a patient should be kept in quarantine. Quarantine is carried out for the good of a community, not for the special benefit of an individual. False sympathy should not persuade us to make false statements in order to release an individual from some personal inconveniences, due to quarantine, when the lives of many will be endangered by such action.

We have in antitoxine a most efficient agent in checking the progress of diphtheria, so far as the patient is concerned, but it should be borne in mind that the hypodermic injection of antitoxine does not kill the *bacillus diphtheriae* present in the nose and throat of the patient.

TRANSPORTATION OF THE DEAD.

On October 20th railroad representatives met at this office for a final discussion of matters pertaining to the new rules and regulations relating to the transportation of the dead. It was announced that the state board of health would furnish sufficient copies of the new shipping permit rules to govern the preparation of the remains of those who have died of an infectious disease, for transportation, list of medical health officers within the state, and list of licensed embalmers, for the railroads in Minnesota to furnish a copy of each to their agents throughout the state. This, I may state, has been done.

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October 27th the second examination of embalmers for the special license of this board was held at this office. Twenty-five applicants appeared, and of these nineteen passed. There are, therefore, 103 embalmers at this date to whom certificates have been issued.

On Nov. 1, 1898, these new shipping regulations went into effect. I had written to the various state boards of health in order that we might learn what states would honor our permits. The replies have been quite satisfactory, and can be formulated as follows:

Colorado, Illinois, Indiana, Iowa, Kentucky, Mississippi, Missouri and Tennessee already have rules or laws quite similar to ours and will honor our permits.

California, Connecticut, Delaware, Kansas, Louisiana, Maryland, Nebraska, New Hampshire, New York, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, West Virginia and Wisconsin are willing to honor our permits. They have no similar rules or laws, but hope to have such in the near future.

Massachusetts, Maine, Michigan and New Jersey will accept our permits, provided permission is secured from the health officer at the point to which the body is to be shipped.

The South Carolina board of health is not empowered to make such rules. Local boards will not allow movements of bodies dead of infectious disease, nor will transportation companies accept such.

Alabama, Arkansas, Florida, Nevada, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma Territory and South Dakota have not replied to my letters of September 23d and November 7th.

I feel that our board should be proud of having acted so promptly and so satisfactorily in placing the transportation of the dead upon a safe basis. I am sure that, through the coöperation of the railroads and of the embalmers, a great deal has been gained for the safety of our state and the comfort of the bereaved friends of those who may have died away from their homes. I hope other states will hasten to take a similar position, in order that we may reciprocate with all. Of course, governed by our new rules, we cannot receive bodies from other states that are less strict than we are.

October 29th I received a letter and map from Maj. W. A. Dennis, relating to the outbreak of typhoid fever among the soldiers of the Fifteenth Minnesota Volunteers, while camping on the state fair grounds, August, 1898.

At the request of the board of health of Marshall, I visited that place December 22d and 23d. Among those interested in local sanitation that I met were the members of the local board of health,

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Dr. Copeland, Mr. Chase and Mr. Frank Bryant; also, Mr. Sullivan, president of the school board, Mr. Whitney and the physicians of the place, Drs. Pearson, Weimar, Renniger and Hobday, and Hon. J. G. Schutz. The conditions calling for a visit were (1) faulty slaughter houses, (2) questionable ice supply, (3) faulty drinking water, (4) faulty disposal of garbage and manure, (5) quarantine regulations. Slaughter houses about Marshall have been a source of complaint for some time. I visited one that was beyond the jurisdiction of the village. It can only be described as filthy. It is located near the river, and the drainage is into this stream about three-fourths of a mile above the point where ice is collected for the town's use. This slaughter house illustrates the importance of having more rigid regulations for the construction and maintenance of these places. The ice supply, referred to as one of the questions deserving sanitary consideration, is taken from the river about three-fourths of a mile below the slaughter house. This is a small stream at best. The ice is collected from an old mill pond. There are houses near the bank of this stream above the pond where the ice is collected. Without any chemical or bacteriological analysis of this ice, the surroundings of the pond and condition of the stream above the pond are sufficient to condemn this ice. I have therefore recommended that, after this season, the village require that its ice supply shall be collected from some less objectionable body of water. The drinking water is not very satisfactory. It is obtained from three sources: (a) village water (artesian wells); (b) deep wells; (c) surface wells. There is a part of the village where typhoid fever has prevailed more or less for some years. Undoubtedly the surface wells should be condemned here. The case is somewhat complicated, however, by the fact that the city water (artesian wells) is not a palatable drinking water. It is a hard water, with a decidedly mineral taste, and is said to be laxative. By going down about 250 feet it is stated that a palatable soft water can be obtained. There are a number of such private wells, and some of the citizens buy water from those owning such private wells for their drinking supply. Some attempt should be made by the village to establish a more satisfactory water supply, and then all surface wells should be condemned. As it is, some of the wells on places where typhoid fever has been prevailing should be condemned and filled up. I have advised that a chemical analysis be made of the city water, the soft water from deep wells, the water from special surface wells, and the ice cut for domestic use.

As for the disposal of garbage: Certain people whose back yards abut against the river use this means for the disposal of

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waste sewage, stable manure, etc. The stream is a small one during the winter, and is stagnant during warm weather. It is now practically an open sewer. I have advised that this condition be tolerated no longer. Stable manure must be hauled away. Sewage must be properly cared for in vaults and cesspools.

Incidentally, I had an oportunity to give some suggestions upon the care and quarantine of diphtheria and on the use of antitoxine. There seems to have been more or less throat trouble in the surrounding country. On December 22d a child of a livery driver died of laryngeal diphtheria. The child was first ill about December 16th. A physician first saw it December 19th. It was dangerously ill, and the disease recognized as laryngeal diphtheria December 21st. Antitoxine was not used. Rumor says that the father drove the hearse about December 13th for the funeral of an undoubted case of diphtheria, and that he had a sore throat that was not treated by any physician. He drove a physician to attend cases of diphtheria December 9th and 11th. It is the funeral of one of these cases that he is said to have attended.

On my return from Marshall I had an opportunity to spend twenty minutes with Dr. Beise, the health officer of Tracy, and to talk over conditions at that city. Dr. Beise gave his experience with the bacteriological, or time, regulation of quarantine. It was to the effect that in many cases four weeks was found to be insufficient; that people knowing of the two methods objected to a culture being taken, preferring to have the time quarantine; that with these known facts the time quarantine for diphtheria should be lengthened or abandoned. He also dwelt upon the disadvantages of delay in reports from the state laboratory, often amounting to three days, and used this as an argument for the state board of health to establish branch bacteriological laboratories at different points in the state. I pointed out what I considered the impracticability of such action on the part of the state board, and the advisability of local boards arranging to have some of their bacteriological work done at home. There are several important questions presented as a result of this trip to Marshall and Tracy.

You will remember that the biennial report for 1895-96 was not published two years ago, and that I was instructed to publish this with the report for the past two years. This is being done. The work is all in press, and will soon be ready for distribution. The biennial report for 1897-98 would naturally include this quarterly report, but it was impossible to do this and have the report completed at this time. I would suggest that, as our fiscal year ends with July of each year, our reports be made to conform with the

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fiscal year. This would give the time between the July meeting and the following January to secure the publication of the regular biennial report. In this way a full report up to date can appear with those of other departments, published just before the meeting of the legislature.

I cannot close my report without a word of praise for the office force. In connection with the vital statistics, there is work enough for two persons, and up to 1897 two clerks were actually employed. Since then, however, my correspondence has been carried on by one of these clerks, in addition to her former regular duties. Of the three clerks in the employ of the board, all are capable; all are doing a great amount of work, and doing it willingly. The vital statistics reports speak well for those who have that responsibility resting upon them, viz., Miss Hayes and Miss Anderson. The stenographic correspondence is well conducted by Miss Anderson, in addition to her work upon vital statistics, while Mr. Peterson looks after affairs in general, filing records, conducting some of the correspondence of the office, etc.

H. M. BRACKEN, M. D.,
Secretary.

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MATTERS IN GENERAL PERTAINING TO SANITATION.

In June, 1898, I sent out the following list of questions to the health officers or acting health officers of 228 cities, boroughs and villages in Minesota having a population of 400 and upward:

Minnesota State Board of Health,
515 Pioneer Press Building,
St. Paul, Minn.
.....189

.....

.....

My Dear Doctor: I am preparing the biennial report of the state board of health, and will ask you, as health officer, to aid me in making the report as complete as possible by answering the following questions:

1. Name of city or village.
2. Estimated population.
3. Health officer.
   (a) What salary does he receive?
4. Infectious diseases during 1897—
   Diphtheria—how many cases?
   (a) Is quarantine regulated by a time limit or by bacteriological report?
   (b) If quarantine is regulated by a time limit, how long a period is it?
   (c) If quarantine is regulated by bacteriological examination, by whom is this examination made?
   Scarlet fever—how many cases?
   (a) How long is quarantine maintained?
   Tuberculosis—how many cases?
   (a) Is any effort made to educate people as to the infectious nature of this disease?
   (b) Is any effort made to regulate the disinfection of tuberculous discharges?
   Typhoid fever—how many cases?
   (a) Is the Widal blood test used as an aid to diagnosis?
   Epidemic cerebro spinal meningitis—how many cases?
   Leprosy—if none within your jurisdiction, do you know of any cases?
5. Schools—
   (a) Is any attempt made to control the spread of infectious diseases in schools?
   (b) Are cases of infectious diseases reported by the local board of health to the superintendent or principal of schools?
   (c) Are children from a house where an infectious disease exists excluded from school? If so, for how long a time?

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6. Milk supply—
   (a) Is it of good quality?
   (b) Is there local inspection of milk?
   (c) Is the tuberculin test required for dairies furnishing milk within your jurisdiction?
   (d) Is a permit required to sell milk?
   (e) Are the dairies and dairy herds furnishing milk within your jurisdiction inspected?
7. Meat supply—
   (a) Is the meat consumed as food subject to inspection?
   (b) What is the character of beef furnished?
   (c) Estimated number of beeves killed per annum.
   (d) Estimated number of hogs killed per annum.
8. Slaughter houses—
   (a) Are there any within your jurisdiction?
   (b) Are the slaughter houses kept in good condition?
   (c) Are hogs kept at the slaughter houses?
   (d) Are hogs fed on the offal from slaughter houses?
9. Packing houses—
   (a) Are there any within your jurisdiction?
   (b) If any, are the animals killed inspected before or after slaughter?
10. Railroad shipping yards—
   (a) Are there any within your jurisdiction?
   (b) If so, are they well kept?
   (c) Are the pens roofed over?
   (d) What flooring is used in the pens?
   (e) Are the floors in good condition?
   (f) Is stock allowed to remain indefinitely in these pens?
11. Garbage—how is it disposed of?
12. Sewage—how is it disposed of?
   (a) If by sewers, into what do they discharge?—number of outlets?
   (b) Are you satisfied with present system of sewage disposal?
13. Vaults and cesspools—
   (a) If you have a system of sewers, are vaults and cesspools also permitted in districts provided with sewers?
   (b) Are water-tight privy vaults and cesspools required?
   (c) How are privy vaults or cesspools cleaned?
   (d) Are abandoned privy vaults or cesspools filled with earth without cleaning?
   (e) Are abandoned wells or cisterns used as cesspools?
   (f) What is the estimated number of vaults or cesspools used within your jurisdiction?
14. Water supply—
   (a) Source.
   (b) Possible contamination.
   (c) Changes considered advisable.
15. Ice—
   (a) Source.
   (b) Possible contamination.
   (c) Is it collected under inspection?

H. M. BRACKEN, M. D.,
Secretary and Executive Officer.

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From these 228 places I have received 214 replies. These replies have been tabulated and are on file in this office. It is not practicable to give such a bulky table in this report, but it may be well to make some coments upon it.
Hence the following:

Question No. 2—Estimated population?

The estimates given are, with scarcely an exception, considerably larger than the state census returns for 1895.

Question No. 3—Health officer. (a). What salary does he receive?

This question was presented in order to correct any error on our list of health officers, and to show the inadequate salaries paid these officials. The difficulty which many of our villages have in inducing a physician to accept the position and properly fulfill the duties of a health officer is undoubtedly due in many cases to the lack of proper compensation. Of ninety-three villages and cities that have laymen acting as health officers, forty-seven have physicians in residence who are eligible to the position. Of the 214 places answering the question as to salary, 83 pay their health officer no salary.

Seven pay their health officers from $5 to $10 per annum.
Thirty-one pay their health officers from $10 to $20 per annum.
Thirty-six pay their health officers from $20 to $30 per annum.
Nine pay their health officers from $30 to $40 per annum.
Four pay their health officers from $40 to $50 per annum.
Thirteen pay their health officers from $50 to $60 per annum.
Four pay their health officers from $60 to $70 per annum.
One city pays its health officer $75 per annum.
Twelve cities pay their health officers $100 per annum.
One city pays its health officer $125 per annum.
Three cities pay their health officers $150 per annum.
Five cities pay their health officers $200 per annum.
One city pays its health officer $250 per annum.
One city pays its health officer $500 per annum.
One city pays its health officer $850 per annum.
One city pays its health officer $2,250 per annum.
One city pays its health officer $2,400 per annum.

Of the eighty-three places that pay their health officers no salary, twenty-two have an estimated population of from 1,000 to 1,500, one of 1,700, one of 2,000, two of 2,200; one of 2,300; one of 2,500; one of 2,600, one of 2,800, one of 5,000.

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Question No. 4—Infectious diseases during 1897.

Diphtheria—How many cases?

To this question I received 210 replies. One hundred thirty-six reported no cases and 74 reported 999 cases.

(*a*) Is quarantine regulated by a time limit or by bacteriological report?

To this there were 163 answers, and of the 65 not replying all but 3 had reported no cases of the disease in 1897. Of the 163 answering the question, quarantine is regulated in 111 places by time limit, in 28 by bacteriological examination, in 19 by both time and bacteriological examination, in 2 by neither time nor bacteriological examination (no case of the disease was reported from either of these places), in 2 places by attending physician, and 1 reported "no quarantine." The health officer of this latter place reports two cases of the disease for 1897.

(*b*) If quarantine is regulated by time limit, for how long a period is it?

To this there were 121 replies. The health officer who replies, "No quarantine," under (a), reports two cases of the disease in 1897, and answers this question, "kept in the house three weeks,"

The other replies are: Twelve unknown, doubtful, variable, etc. (Four of these report cases of the disease during 1897.)

Eight until well. (One of these reports cases of the disease.)

Three for ten days. (One of these reports cases of the disease.)

Eight for two weeks. (Five of these report cases of the disease.)

Four for two or three weeks. (One reports cases of the disease.)

Five for one week after well. (Three report cases of the disease.)

One for ten days after well. (One reports cases of the disease.)

Fourteen for three weeks.

Ten for four weeks.

Four for two to four weeks.

Two for two to six weeks.

Five for three to four weeks.

Three for three to five weeks.

One for three to six weeks.

One for three to ten weeks.

Four for four to six weeks.

Nine for six weeks.

One for seven weeks.

Twelve for two weeks after well.

Thirteen for three weeks after well.

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(c) By whom is the bacteriological examination made?

Of the 46 answers to this question, 32 stated by the laboratory state board of health, 2 by the laboratory St. Paul health department, 8 by the local health officer, and 4 by the physicians.

Scarlet Fever—How many cases?

To this question there were 205 replies, of which 140 report no cases.

Sixty-four report 769 cases.

One reports a mild epidemic in which the number of cases is not given. No quarantine was enforced at the latter place.

(a) How long is quarantine maintained?

To this question there were 102 replies, as follows:

One reports no quarantine.

Two for ten days.

Four for two weeks. (Three of these report cases of the disease.)

One for two to three weeks.

One for two to four weeks.

Seventeen for three weeks. (Twelve report cases of the disease.)

Two for three to four weeks.

One for three to five weeks. (Cases reported.)

One for three to six weeks.

Eight for four weeks. (Three report cases of the disease.)

Six until well. (Three of these report cases of the disease.)

Two for one week after well. (One reports cases of the disease.)

Seven for two weeks after well. (Four report cases of the disease.)

Two regulated by attending physician. (One reports cases of the disease.)

One for four to six weeks.

One for four to eight weeks.

One for five weeks.

Twenty-one for six weeks.

Three for eight weeks.

Seven for three weeks after well.

One for five weeks after well.

Eleven until desquamation is completed.

One for nine days after desquamation is completed.

Tuberculosis—How many cases?

To this question there were 190 replies, as follows:

One hundred and two reported a total of 390 cases.

Twenty-six, including St. Paul, Minneapolis, and most of the larger cities, reported the number of cases as unknown.

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Sixty-two stated that they had had no cases.

(*a*) Is any effort made to educate people as to the infectious nature of tuberculosis?

Of 193 replies, 126 say yes, 67 say no.

(*b*) Is any effort made to regulate the disinfection of tuberculosis discharges?

Of 185 replies, 112 say yes, 73 say no.

Typhoid Fever—How many cases?

There were 118 replies to this question.

One hundred and two, including Minneapolis and Duluth, reported 2,392 cases.

Sixteen, including St. Paul and other cities, reported the number of cases unknown.

(*a*) Is the Widal blood test used?

Of 161 replies, 34 say yes, 127 say no.

Epidemic Cerebro Spinal Meningitis—How many cases?

One hundred and sixty-three report no cases.

Five state number of cases unknown.

One reports thirty-two cases.

One reports twenty cases.

One reports six cases.

One reports three cases.

Two report two cases.

Eight report one case.

This question is not answered for St. Paul, Minneapolis or Duluth.

Leprosy—If none within your jurisdiction, do you know of any cases?

Thirteen cases were reported. One health officer reported two cases. We had previous knowledge of all of these cases.

Question No. 5 (relating to schools).

(*a*) Is any attempt made to control the spread of infectious diseases in schools?

Of 196 replies, 185 say yes, 11 say no.

(*b*) Are cases of infectious diseases reported by the local board of health to the superintendent of schools?

Of 195 replies, 170 say yes, 25 say no.

(*c*) Are children from a house where an infectious disease exists excluded from school? If so, for how long a time?

To this there were 192 replies, as follows:

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Eighty say yes.
One says no.
Thirty-two during quarantine.
One for ten days.
One for a few days. (Reports cases of disease for 1897.)
One for ten to fourteen days.
One for fifteen to twenty-five days. (Reports cases of disease.)
One for one to four weeks.
Seven for two weeks. (Report cases of disease.)
Three for two to four weeks. (Two report cases of disease.)
Four for two to three weeks. (Report cases of disease.)
One for two to five weeks. (Reports cases of disease.)
One for two to six weeks.
Ten for three weeks. (Two of these report cases of disease.)
Two for three to four weeks.
Two for three to five weeks.
One for three to six weeks.
Two for four to eight weeks.
Twelve for four weeks.
Ten for six weeks.
Nine until well.
One during school term.
One for one week after recovery.
Two for two weeks after recovery.
Two for three to four weeks after recovery.
Two for two weeks after quarantine.
Two for three weeks after quarantine.

Question No. 6 (relating to milk supply).

(*a*) Is it of good quality?

To this there were 196 replies—172 good, 11 fair, 13 questionable.

(*b*) Is there local inspection of milk?

To this there were 205 replies—5 yes, 200 no.

Those requiring inspection are Brownsville (v), Hinckley (v), Kenyon (v), Minneapolis (c) and Winona (c).

(*c*) Is the tuberculin test required for dairies furnishing milk within your jurisdiction?

To this there were 201 replies—8 yes, 193 no. Those requiring the test are Brownsville (v), Crookston (c), Hinckley (v), Kenyon (v), Marshall (v), Minneapolis (c), St. Louis Park (v) and Spring Valley (v).

(*d*) Is a permit to sell milk required?

To this there were 205 replies—18 yes, 187 no.

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Those requiring a permit are Austin (c), Blue Earth City (v), Faribault (c), Hastings (c), Hinckley (v), Kenyon (v), Minneapolis (c), New Ulm (c), Pine Island (v), Red Wing (c), Redwood Falls (v), Rochester (c), St. Cloud (c), St. Paul (c), Stillwater (c), Waterville (v), Winona (c) and Zumbrota (v).

(*e*) Are the dairies and dairy herds furnishing milk within your jurisdiction inspected?

To this there were 201 replies—14 yes, 187 no. Those answering yes are Austin (c), Brownsville (v), Duluth (c), Edina (v), Faribault (c), Hinckley (v), Kenyon (v), Minneapolis (c), Rush City (v), St. Louis Park (v), St. Paul (c), Spring Valley (v), Willmar (v) and Winona (c).

Question No. 7 (relating to meat supply).

(*a*) Is the meat consumed as food subject to inspection?

To this there were 210 replies—20 yes, 190 no.

Those requiring inspection are Aitkin (c), Biwabik (v), Brainerd (c), Duluth (c), Eagle Bend (v), Gaylord (v), Hallock (v), Hinckley (v); Howard Lake (v), Hutchinson (v), Lakefield (v), Lamberton (v), Minneapolis (c), St. Paul (c), Sherburne (v), Slayton (v), South St. Paul (c), Waite Park (v), West St. Paul (c) and Winona (c).

(*b*) What is the character of beef furnished?

To this there were 170 replies—96 good, 56 fair, 11 tough, 1 old.

Question No. 8 (relating to slaughter houses).

(*a*) Are there any within your jurisdiction?

To this there were 207 replies—102 yes, 45 no, 60 near village but outside limits. Forty-eight of these last 60 replies are no, but as answers are given to the three other questions in this section describing condition, etc., of slaughter houses, it is safe to assume that they have slaughter houses in the near vicinity, although not within the jurisdiction.

(*b*) Are the slaughter houses kept in good condition?

To this there are 160 replies (including those having slaughter-houses near by but not within city or village limits)—102 good, 23 fair, 15 questionable, 2 poor, 8 bad.

(*c*) Are hogs kept at the slaughter houses?*

*The rules of the Minnesota state board of health read as follows:

After April 1, 1898, no hogs shall be permitted to be kept or fed at or about slaughter houses; nor shall the offal from slaughter houses be fed to hogs. These rules are established:

1. To prevent the transmission of certain infectious diseases to mankind.
2. To prevent the spread of certain infectious diseases among animals.
3. To avoid the creation of a public nuisance.

H. M. BRACKEN,
Sec. and Executive Officer.

Approved and adopted Jan. 11, 1898.

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To this there were 161 replies—94 yes, 67 no.

(*d*) Are hogs fed on the offal from slaughter houses?

To this there were 148 replies—77 yes, 71 no.

Question No. 9 (relating to packing houses).

(*a*) Are there any within your jurisdiction?

To this there were 207 replies—8 yes, 199 no.

Those replying yes were Albert Lea (c), Austin (c), Crookston (c), Duluth (c), Lake City (c), St. Paul (c), Shakopee (c) and South St. Paul (c).

(*b*) If any, are the animals killed inspected before or after slaughter?

The replies are yes for Duluth, St. Paul and South St. Paul, and no for Albert Lea, Austin, Crookston, Lake City and Shakopee.

Question No. 10 (relating to railroad shipping yards).

(*a*) Are there any within your jurisdiction?

To this there were 208 replies—168 yes, 40 no.

(*b*) If so, are they well kept?

To this there were 166 replies—128 yes, 40 no.

(*c*) Are the pens roofed over?

To this there were 164 replies—43 yes, 73 no, 48 partly.

(*d*) What flooring is used in the pens?

To this there were 156 replies—102 none or earth, 1 sand, 1 clay and sand, 1 clay, 7 gravel, 1 stone and gravel, 1 stone, gravel and cinders, 2 gravel and cinders, 5 cinders, 1 crushed stone, 2 stone, 1 stone and gutters, 1 concrete, 1 ties and cinders, 3 ties, 9 wood, 3 pine, 1 oak, 13 plank.

(*e*) Are the floors in good condition?

To this there were 95 replies—68 yes, 14 fair, 13 no.

Of the latter thirteen, two have cinder floors, one stone, one part plank and nine earth.

(*f*) Is stock allowed to remain indefinitely in the pens?

To this there were 161 replies—11 yes, 150 no.

The eleven replying yes describe the condition of the pens as follows:

1. Kept in fair condition; pens roofed; dirt floors.
2. Kept in good condition; pens partly roofed; stone floors.
3. Kept in good condition; pens partly roofed; dirt floors in bad condition.
4. Kept in good condition; pens partly roofed; dirt floors.
5. Kept in bad condition; pens not roofed; cinder floors in bad condition.

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6 Kept in good condition; pens partly roofed; gravel floors in good condition.

7. Kept in bad condition; pens not roofed.

8. Kept in fair condition; pens partly roofed; dirt floors in fair condition.

9. Kept in good condition; pens partly roofed; gravel floors in good condition.

10. Kept in fair condition; pens partly roofed; dirt floors in bad condition.

11. Kept in good condition; pens partly roofed; floors in good condition.

Question No. 11 (relating to garbage)—How is it disposed of?

To this there were 173 replies—58 removed to dump, 10 removed to neighboring farms, 14 carted to country, 1 spread on land near by, 1 hauled to nursery, 1 fed to hogs and plowed in, 1 plowed down, 32 removed (carted away), 1 removed on cars, 15 hauled away and buried or burned, 8 burned, 2 carted away and covered, 1 carted away and destroyed, 1 fed, burned, dumped and plowed in, 1 used to fill streets and put on fields, 1 dumped on vacant lots, low places in streets and river bank, 1 used to fill road in swampy places, 1 used to fill streets and covered, 1 dumped in slough and covered, 1 dumped on ice in lake, 2 dumped into river, 1 dumped into slough, 1 dumped into sink holes, 1 fed to hogs and thrown in alleys, 2 removed monthly, 1 removed weekly to dump, 1 removed daily, 1 removed yearly, 1 removed by contract, 1 seldom cleaned, 7 had no special way, 1 remains on ground, 1 surface decay.

Question No. 12 (relating to sewage)—How is it disposed of?

(*a*) If by sewers, into what do they discharge? Number of outlets?

(*b*) Are you satisfied with the present system of sewage disposal?

To this there were 131 replies of no sewers, and of these, 20 health officers state that they are satisfied with the present system, while 54 state that they are not satisfied.

Thirteen report the disposal of sewage by means of vaults and cesspools, and of these, 4 health officers are satisfied with the system, while 9 are not.

Forty-four places have sewers, and of these, 24 report that the sewers empty into rivers. The 24 places have, collectively, about 70 outlets.

Seventeen of the health officers of these 44 places are satisfied with the present system of sewage disposal, while 7 are not satisfied.

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Eight places have sewers which empty into lakes. These 8 places have collectively about 20 outlets. Six of the health officers of these eight places are satisfied with the system, while 2 are not satisfied.

Four places have sewers emptying into creeks. One health officer is satisfied with this system, 2 are not satisfied, 1 makes no reply.

One place has two sewer outlets into a swamp and the health officer is satisfied with the system.

One place has a sewer outlet into a slough. The health officer is not satisfied with the system.

Six health officers do not state into what the sewers under their supervision empty. Three are satisfied with the existing system, 2 are not satisfied, 1 does not state.

Question No. 13 (relating to vaults and cesspools).

(*a*) If you have a system of sewers, are vaults and cesspools also permitted in districts provided with sewers?

To this there were 184 replies—32 have sewers, 152 no sewers.

Of those having sewers, 19 allow vaults and cesspools in sewerage districts.

(*b*) Are water-tight privy vaults and cesspools required?

To this there were 186 replies from places having no sewers—12 yes, 136 no.

From 38 places having sewers there were replies—13 yes, 25 no.

(*c*) How are privy vaults and cesspools cleaned?

To this there were 187 replies in all. Of 148 places with no sewers, 56 have contents of vaults removed in some way, 16 depend upon regular scavengers, 6 have vaults disinfected when emptied, 18 have old vaults filled, and in 52 no attention is given to vaults.

From places with sewers 39 replies were received. Of these, 17 had contents of vaults removed (dug out, etc.), 10 used scavenger system, 1 had vaults cleaned twice a year, 1 had vaults cleaned three times a year, 2 had vaults filled, and 8 had vaults not cleaned.

(*d*) Are abandoned privy vaults or cesspools filled with earth without cleaning?

From places without sewers there were 148 replies—105 yes, 43 no.

From places with sewers there were 39 replies—17 yes, 22 no.

(*e*) Are abandoned wells or cisterns used as cesspools.

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From places without sewers there were 153 replies—13 yes, 140 no.

From places with sewers there were 39 replies—3 yes, 36 no.

(*f*) What is the estimated number of vaults or cesspools used within your jurisdiction?

Many of the health officers answering the other questions in this section made no reply to this.

Question No. 14 (relating to water supply).

(*a*) Source?

(*b*) Possible contamination?

(*c*) Changes considered advisable?

To this there were 202 replies, as follows:

Fifty-four have artesian or deep wells. Of these 30 have no possible contamination, 6 have little possibility of contamination, 5 have surface drainage into streams, 1 has possible contamination from privy vaults. In 30 no changes are considered advisable, and in 5 changes are desired.

One hundred and twenty-four have wells (including places having both artesian or deep wells and shallow wells). Of these 25 have no possible contamination, 7 have little possibility of contamination, 1 has iron contamination, 2 are questionable, 19 have possible contamination, 20 have surface drainage, 16 have possible contamination from privy vaults, and 3 have possible contamination from sewage. In 33 places no changes are considered advisable, and in 34 places changes are desired.

Fourteen receive their water supply from rivers. Of these, 2 have no possible contamination, 1 has little possibility of contamination, 1 has possible contamination, 2 have contamination from surface drainage, 2 have contamination from farms and stables along river above source of supply, 1 has contamination from privy vaults, 1 has contamination from vaults and stock yards, and 2 have contamination from sewage. In 6 no changes are considered advisable, and in 5 changes are desired.

Six receive their water supply from springs. Of these, 4 have no possible contamination, 1 has possible contamination from surface drainage. No changes are considered advisable.

Four receive their water supply from lakes. Of these, 1 has a slight possibility of contamination, and 2 have sewage contamination. In 1 no changes are considered advisable, and in 2 changes are desired.

Question No. 15 (relating to ice)—(a) Source? (b) Possible contamination? (c) Is it collected under inspection?

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To this there are 197 replies, as follows:

Eighty-two from rivers. Of these 15 have possible contamination, 13 have possible contamination from surface drainage, 2 have possible contamination from slaughter houses, 1 has possible contamination from hog pens and garbage, 2 have possible contamination from manure piles, 1 has possible contamination from vaults and stock yards, 1 has possible contamination from dead animals, 2 have possible contamination from sewage, 5 have little possibility of contamination, and 16 have no possible contamination. In 73 no changes are considered advisable, and in 5 changes are desired.

Eighty-two from lakes. Of these 13 have possible contamination, 5 have probably no contamination, 6 have possible contamination from surface drainage, 1 has possible contamination from sewage, 1 has possible contamination from dead animals, 8 have slight possible contamination, and 21 have no possible contamination. In 71 no changes are considered advisable, and in 10 changes are desired.

Four from creeks. Of these 2 have possible contamination, and 1 from surface drainage. No changes desired.

Twelve from ponds. Of these 2 have possible contamination, 2 have possible contamination from surface drainage, 1 has possible contamination from dumpings, 3 have slight possibility of contamination, and 3 have no possible contamination. In 11 no changes are considered advisable.

Seventeen from rivers and lakes. Of these 5 have possible contamination, 1 has no possible contamination, 1 has sewage contamination, 11 have contamination from dumped garbage, and 1 has contamination from dead hogs. In 15 no changes are considered advisable, and in 2 changes are desired.

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REPORTED FOUR YEARS' RECORD FOR DIPHTHERIA, SCARLATINA AND TYPHOID FEVER.

Counties.	Diphtheria.								Scarlatina.								Typhoid Fever.	
	1895.		1896.		1897.		*1898.		1895.		1896.		1897.		*1898.		*1898.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Aitkin		2					1											
Anoka	3	5	4	1	1	1					10			1				3
Becker			1	1						1	1	1		1	3			
Beltrami																		
Benton		3	1	2		1	3			1	1	2						
Big Stone		2	5	5					3								1	2
Blue Earth	2	4	6	2	3	2	3	2	3	4	2		34		11		6	3
Brown	25	4	11		1		9	1	1			2		1	5		3	5
Carlton		1	7	1	19	7		1										2
Cass							1											
Carver	9	11	4		2	1	42	2			1	1	2				4	1
Chippewa	2	2	6	3					2		6				1			3
Chisago		2		2	7		9								6	1	9	2
Clay		2	4	3			18	10	3	1		1	3				2	6
Cook																		
Cottonwood	6	6	7	4	5	2	2				1	1					1	
Crow Wing		2			4		12	1										1
Dakota	17	15	30	5	8	9	3	2	18	6		2	2				3	1
Dodge			1	1	32	8	7						1	2			1	1
Douglas	2		2	5		7	11	6	27	6	12	1	1			1	16	7
Faribault	3	2	3	4	6		8					1	1					2
Fillmore	7	1	30	11	14	5	28	8	7	4		1					8	1
Freeborn	8	9	23	7	5	9	41	1		1	2	1	3		4		2	3
Goodhue	32	17	1 18	8	22	10	13	3	4		1		5				13	5
Grant	6	1	1				1						3					1
Hennepin	613	88	662	115	776	33	219	16	367	13	267	8	187	7	136		620	53
Houston	7	1	1	1	3	1	5				2		4	1	33			1
Hubbard							3	3							2		7	1
Isanti		1		4			1	1		1						1		1
Itasca																		
Jackson	5	3	10	2		1			2	3	5				13		11	4
Kanabec				2			30	1										
Kandiyohi	41	3	40	6	3	6	22	4	12	2		1			1			1
Kittson		1							4	1				1		1		
Lac qui Parle								1			1	1	3					
Lake		1	1														1	1
Le Sueur	4	2	22	3	3	1	11			2	41		2	3				1

* To December 1st.

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REPORTED FOUR YEARS' RECORD FOR DIPHTHERIA, SCARLATINA AND TYPHOID FEVER.

Counties.	Diphtheria.								Scarlatina.								Typhoid Fever.	
	1895.		1896.		1897.		*1898.		1895.		1896.		1897.		*1898.		*1898.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Lincoln	.....	5	.....	.....	25	7	7	.....	6	.....	.....	.....	6	.....	.....	.....	.....	1
Lyon	6	11	3	4	10	4	14	3	3	1	.....	.....	7	1	.....	1	3	2
McLeod	.....	.....	1	3	8	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	4
Marshall	2	4	3	1	4	5	13	4	.....	.....	.....	.....	.....	.....	.....	.....	1	3
Martin	1	.....	1	1	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Meeker	.....	2	1	.....	10	2	17	3	1	.....	1	1	.....	.....	9	.....	2	2
Mille Lacs	.....	.....	.....	3	.....	.....	1	.....	2	.....	.....	1	.....	.....	10	.....	.....	.....
Morrison	3	7	38	12	4	3	8	4	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Mower	6	3	33	19	27	7	5	1	.....	.....	6	1	.....	.....	.....	1	.....	4
Murray	1	.....	2	.....	7	1	9	1	.....	.....	4	.....	.....	.....	.....	.....	.....	2
Nicollet	2	7	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	3	.....	11	.....	15	3
Nobles	2	4	4	3	.....	.....	2	.....	36	6	.....	.....	.....	1	3	.....	14	.....
Norman	.....	.....	.....	.....	.....	2	7	.....	3	3	.....	.....	8	.....	.....	.....	2	1
Olmsted	5	6	12	4	18	3	9	1	5	2	10	.....	.....	3	.....	.....	.....	.....
Otter Tail	1	2	20	4	3	1	3	1	6	6	11	7	.....	1	4	2	17	5
Pine	.....	.....	.....	.....	.....	1	4	1	.....	.....	.....	.....	.....	.....	10	.....	.....	.....
Pipestone	7	1	4	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Polk	10	10	14	21	8	4	2	1	3	.....	2	4	10	3	4	.....	1	9
Pope	3	.....	.....	1	.....	2	.....	.....	.....	.....	3	1	.....	.....	.....	.....	.....	.....
Ramsey	417	66	340	72	383	46	398	41	231	3	176	5	205	11	318	16	.....	40
Red Lake	.....	.....	.....	4	.....	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Redwood	40	7	30	2	19	3	33	7	2	.....	.....	.....	.....	.....	.....	.....	2	1
Renville	12	12	13	3	12	1	1	1	2	.....	.....	.....	.....	1	.....	.....	.....	.....
Rice	3	17	2	3	47	16	28	1	11	.....	.....	1	4	.....	.....	.....	.....	6
Rock	5	2	1	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rosean	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Scott	35	23	13	3	1	4	9	1	3	.....	1	1	.....	.....	.....	.....	.....	.....
Sherburne	4	1	.....	.....	.....	.....	9	3	.....	.....	.....	.....	.....	.....	.....	2	.....	1
Sibley	1	3	1	2	10	.....	7	.....	1	1	.....	1	.....	.....	7	.....	.....	.....
Stearns	21	29	60	40	17	4	26	6	2	6	1	1	.....	1	9	.....	2	1
Steele	24	5	47	4	51	7	1	.....	.....	.....	4	.....	.....	.....	3	1	.....	2
Stevens	1	.....	9	2	2	1	29	.....	.....	1	.....	.....	1	.....	.....	.....	3	3
St. Louis	54	8	88	16	14	4	5	1	131	12	48	4	25	3	27	3	53	27
Swift	1	4	5	1	6	1	5	3	4	1	2	1	.....	.....	.....	.....	1	2
Todd	.....	4	2	.....	27	4	50	10	.....	3	2	2	2	.....	1	.....	.....	1
Traverse	2	1	5	.....	12	1	4	1	.....	.....	.....	.....	.....	2	.....	.....	2	2
Wabasha	10	9	10	1	25	2	15	2	.....	1	.....	.....	.....	.....	2	.....	4	1
Wadena	3	.....	4	1	10	2	19	3	7	1	.....	.....	.....	.....	.....	.....	.....	1
Waseca	4	5	1	3	.....	1	12	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Washington	20	14	1	2	6	1	2	4	.....	.....	.....	2	.....	.....	.....	.....	.....	1
Watonwan	2	.....	4	2	17	4	20	3	6	6	3	.....	.....	.....	6	.....	1	3
Wilkin	.....	.....	.....	.....	.....	.....	.....	.....	5	1	2	.....	.....	.....	.....	.....	.....	1
Winona	15	4	32	1	3	3	1	.....	5	1	1	1	.....	.....	.....	.....	.....	2
Wright	12	10	18	6	9	.....	17	5	13	1	6	.....	5	2	13	1	2	2
Yellow Medicine	22	10	1	1	26	4	17	1	10	2	43	1	6	2	2	.....	2	2
					3	1	4	1	4	2							1	
Totals	1,554	509	1,755	478	1,743	295	1,554	193	955	104	585	69	550	48	554	31	347	205

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CHARTS

SHOWING MONTHLY MORTALITIES—AVERAGE OF ELEVEN YEARS, 1887-1897, INCLUSIVE.

CHART NO. I.—DIPHTHERIA.
CHART NO. II.—CROUP.
CHART NO. III.—SCARLATINA.
CHART NO. IV.—MEASLES.
CHART NO. V.—TYPHOID FEVER.
CHART NO. VI.—TUBERCULAR DISEASES.
CHART NO. VII.—DIARRHŒAL DISEASES OF CHILDREN.
CHART NO. VIII.—PNEUMONIA.
CHART NO. IX.—BRONCHITIS.

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CHART NO. I.—DIPHTHERIA.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

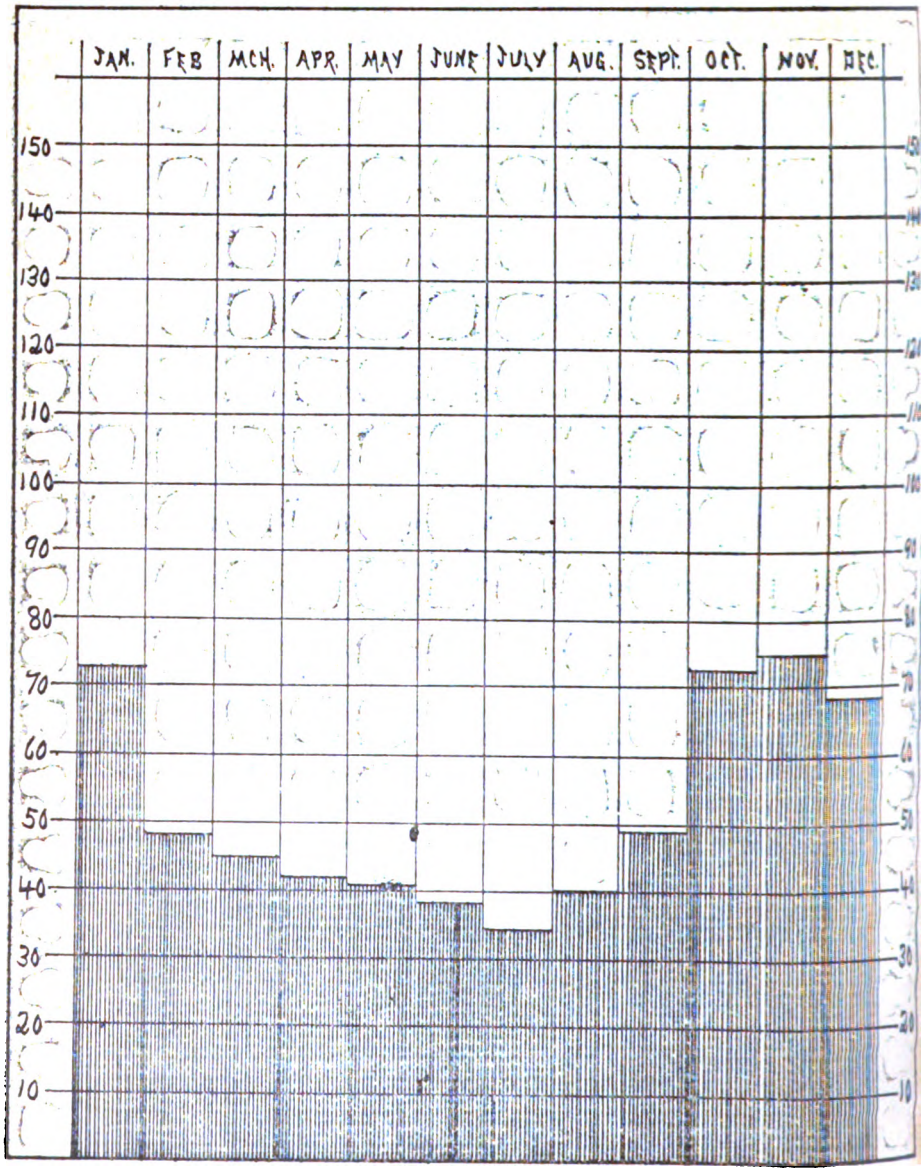

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CHART NO. II.—CROUP.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

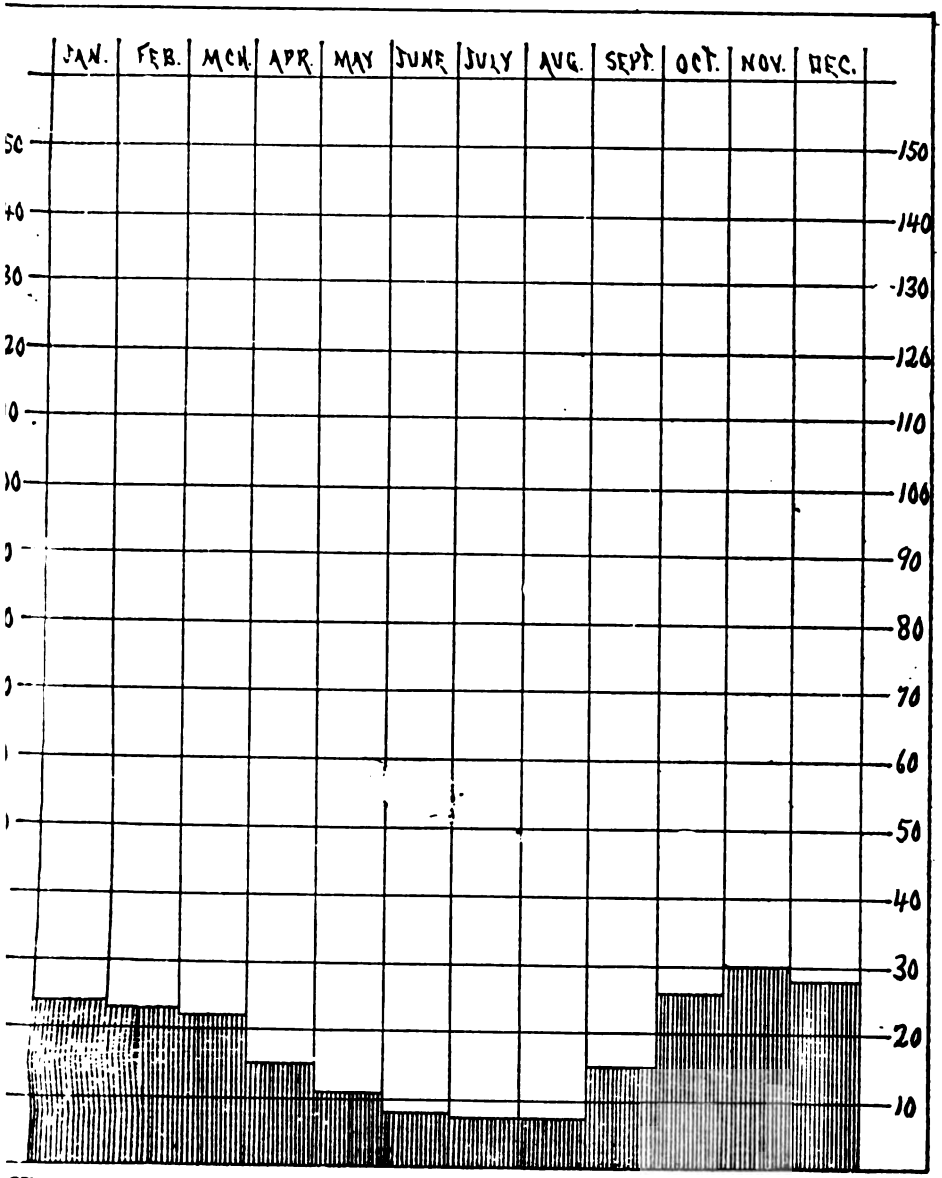

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CHART NO. III.—SCARLATINA.

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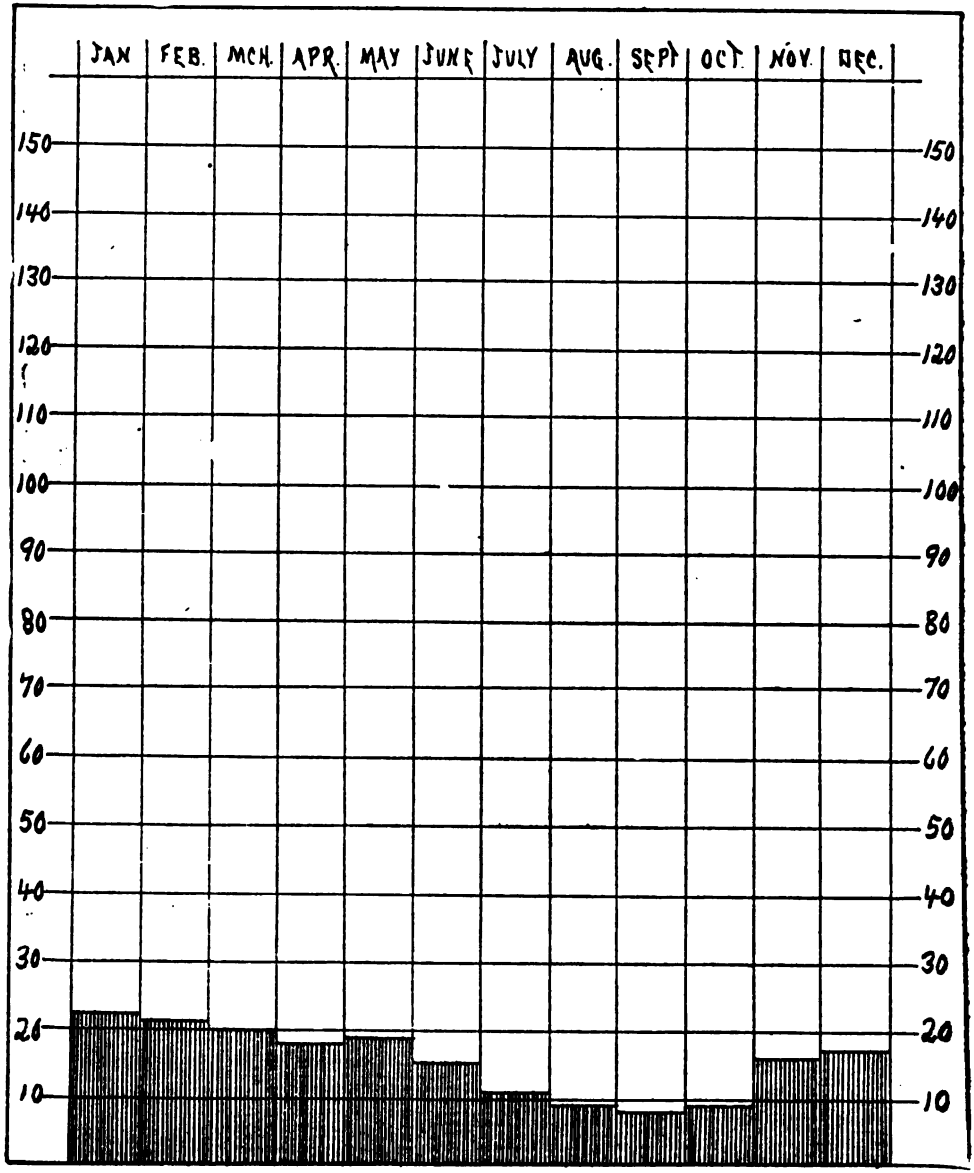

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CHART NO. II.—CROUP.

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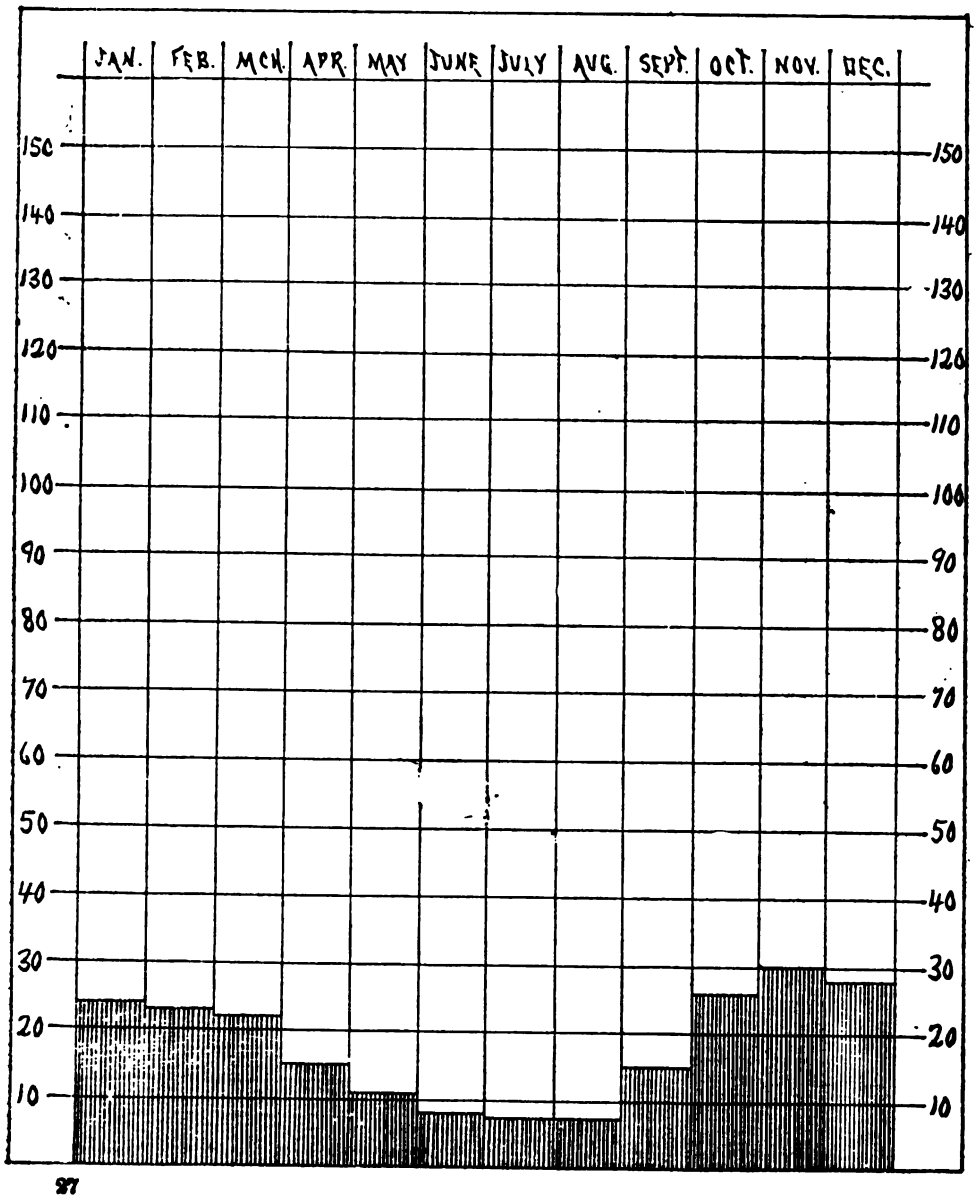

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CHART NO. V.—TYPHOID FEVER.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

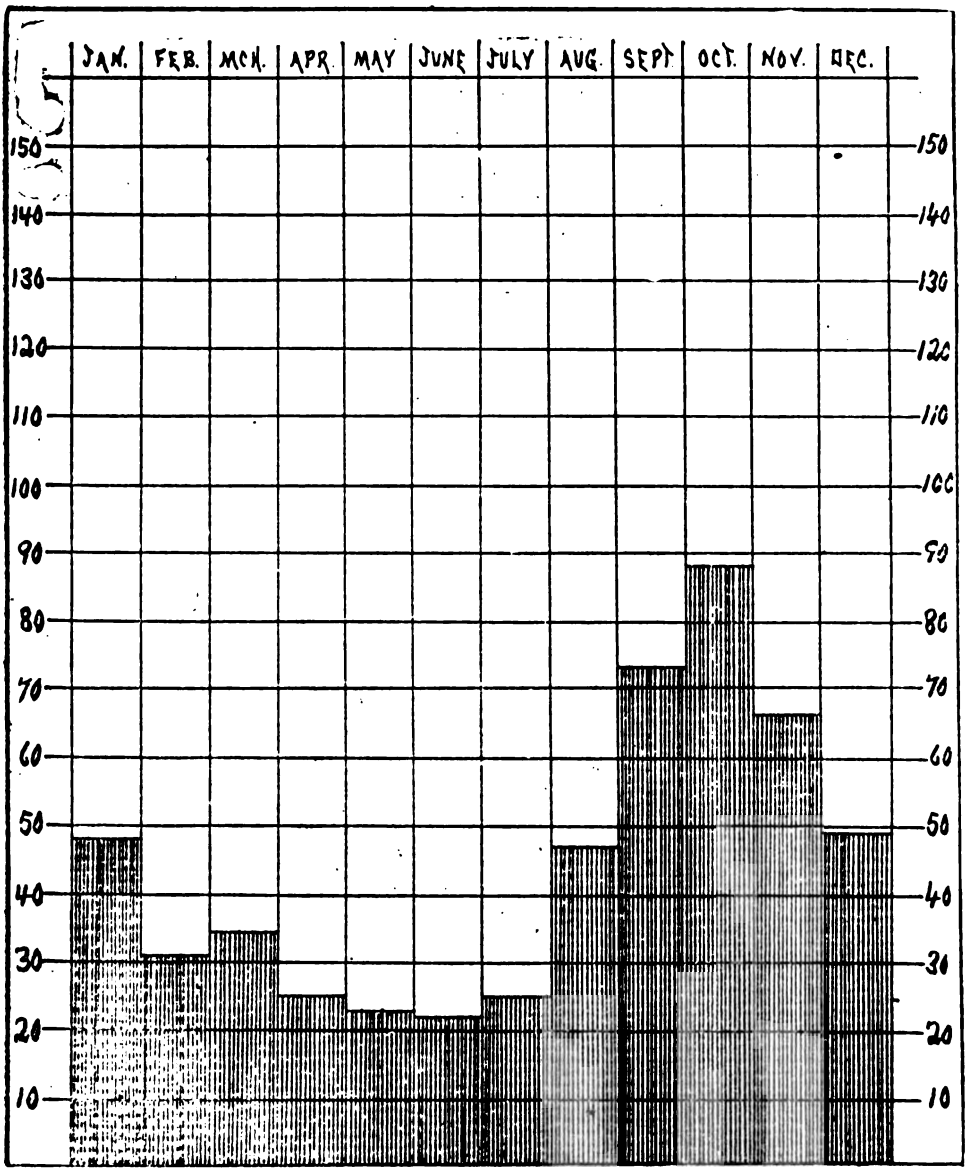

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CHART NO. VI.—TUBERCULAR DISEASES.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

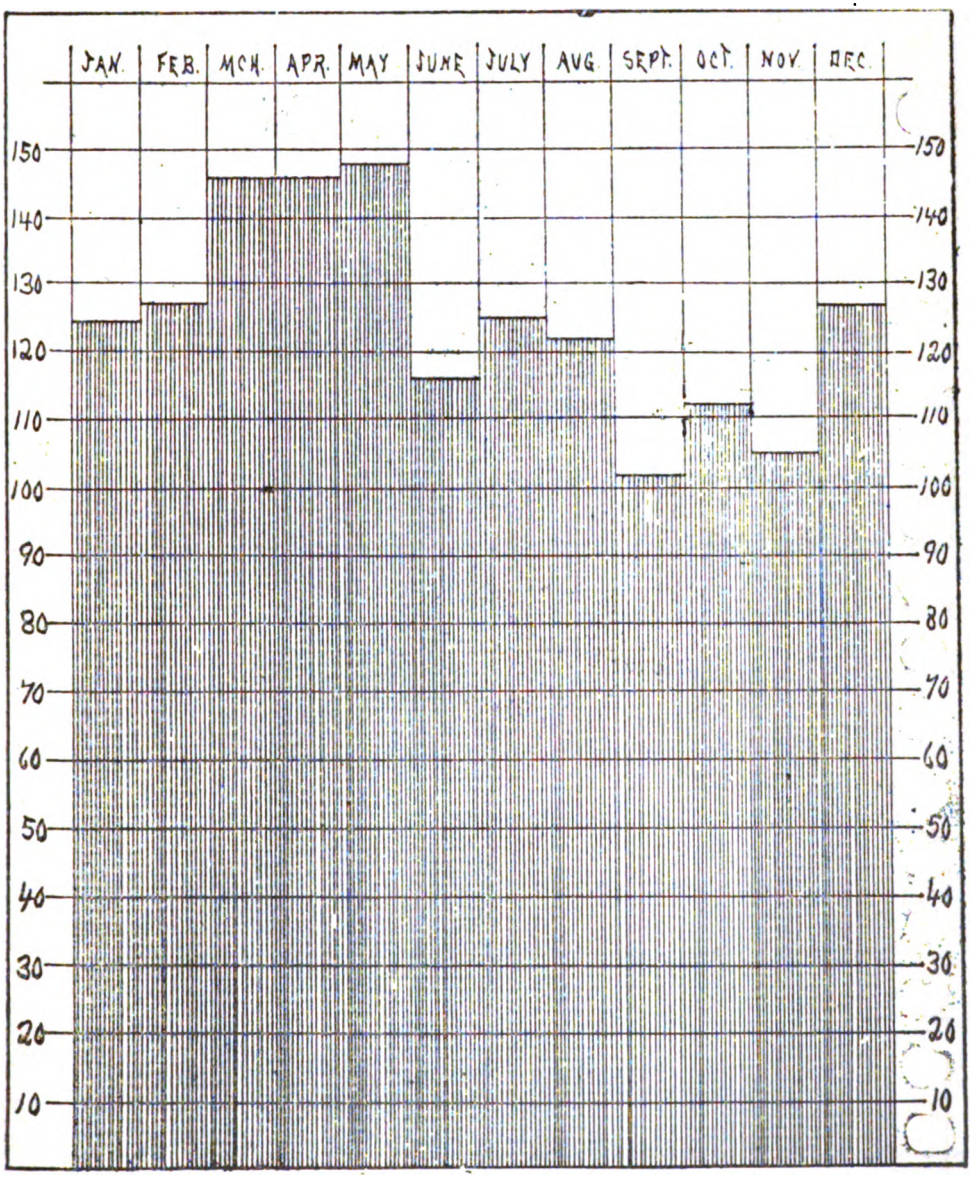

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CHART NO. VII.—DIARRHŒAL DISEASES OF CHILDREN.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

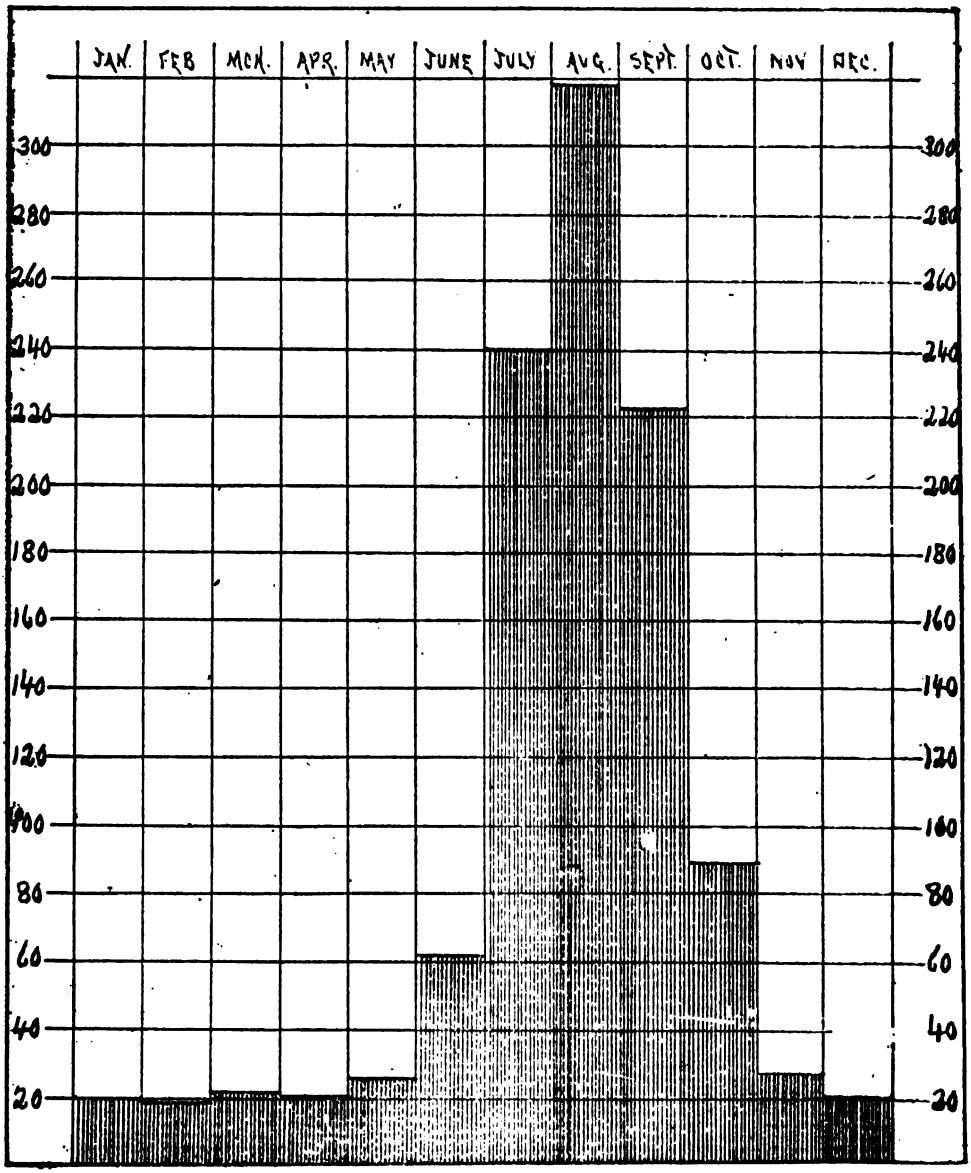

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CHART NO. VIII.—PNEUMONIA.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.

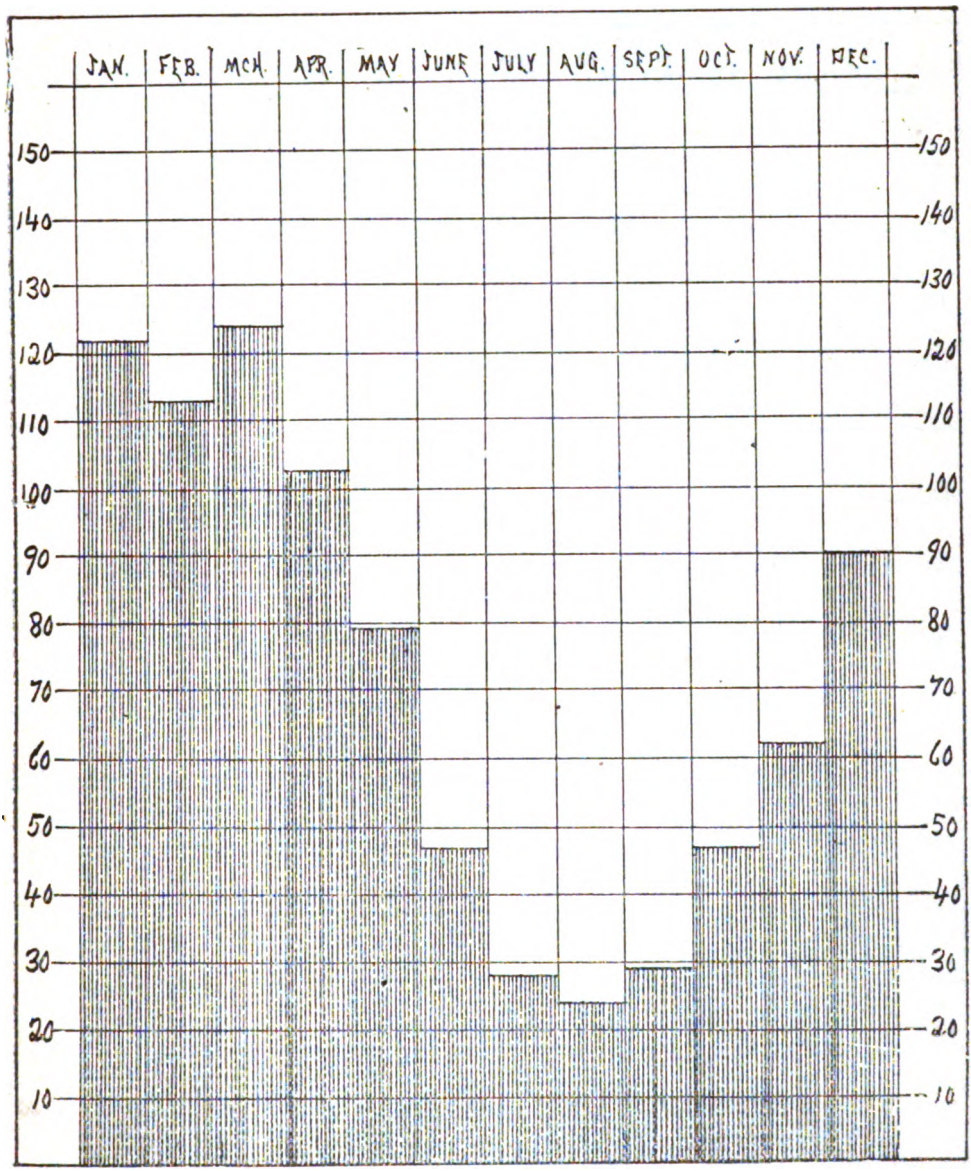

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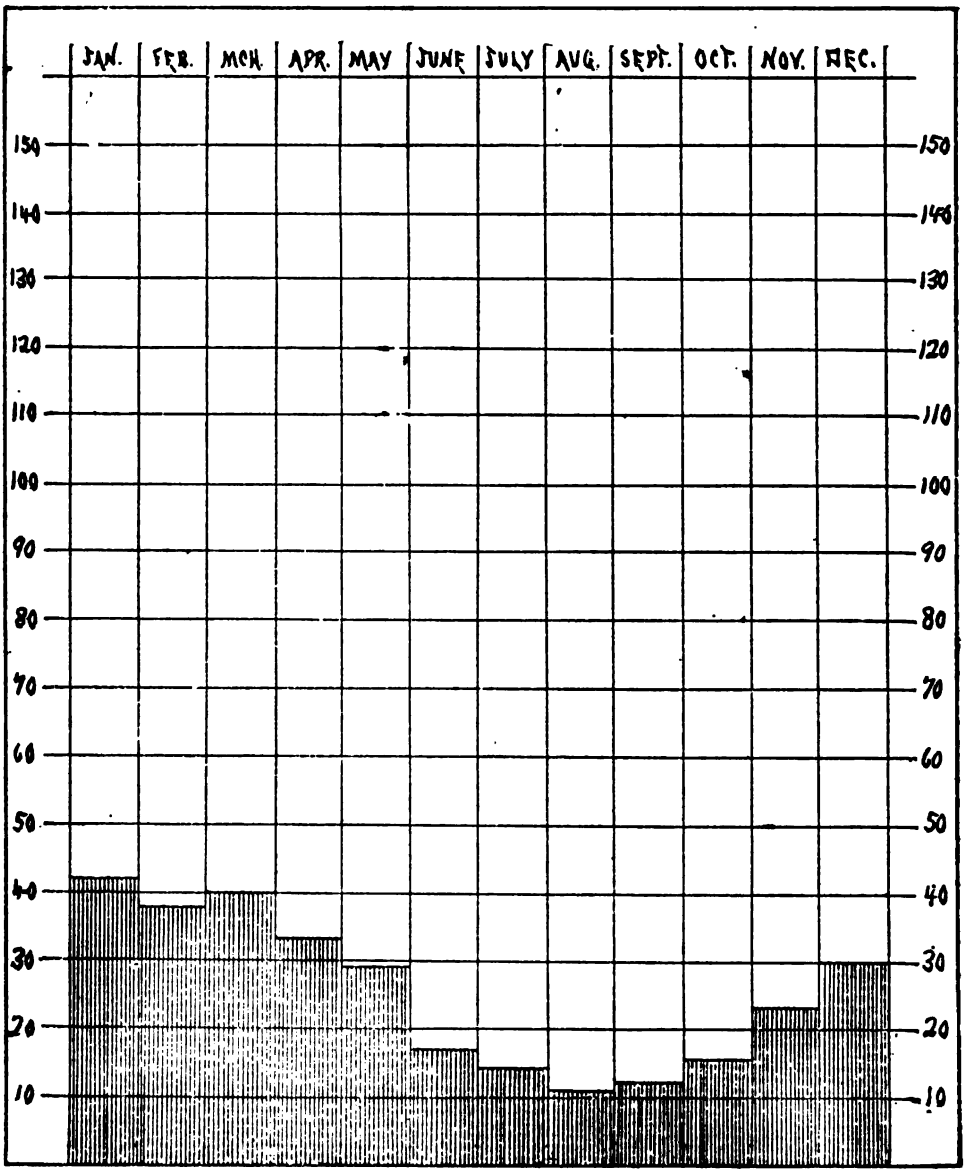
CHART NO. IX.—BRONCHITIS.

AVERAGE MONTHLY MORTALITIES FOR ELEVEN YEARS—1887-1897, INCLUSIVE.



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CHARTS

SHOWING ANNUAL DEATH RATE PER 100,000 POPULATION FOR ELEVEN YEARS, 1887-1897, INCLUSIVE.

The whole state.....

Total cities over 5,000 population.....

State outside cities over 5,000 population. .....

Total cities between 5,000 and 15,000 population

Minneapolis.....

St. Paul.....

Duluth .....

Winona.....

NOTE.—The populations of all the above are estimated by adding the average annual increase, as shown by the United States census of 1880 and 1890, to each succeeding year for the years between 1880 and 1890, and the average annual increase as shown by the United States census of 1890 and the State census of 1895 for the years between 1890 and 1897.

CHART NO. X.—DIPHTHERIA.

CHART NO. XI.—CROUP.

CHART NO. XII.—SCARLATINA.

CHART NO. XIII.—MEASLES.

CHART NO. XIV.—TYPHOID FEVER.

CHART NO. XV.—TUBERCULAR DISEASES.

CHART NO. XVI.—DIARRHŒAL DISEASES OF CHILDREN.

CHART NO. XVII.—PNEUMONIA.

CHART NO. XVIII.—BRONCHITIS.

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CHART NO. X.—DIPHTHERIA.

ANNUAL DEATH RATE PER 100,000.

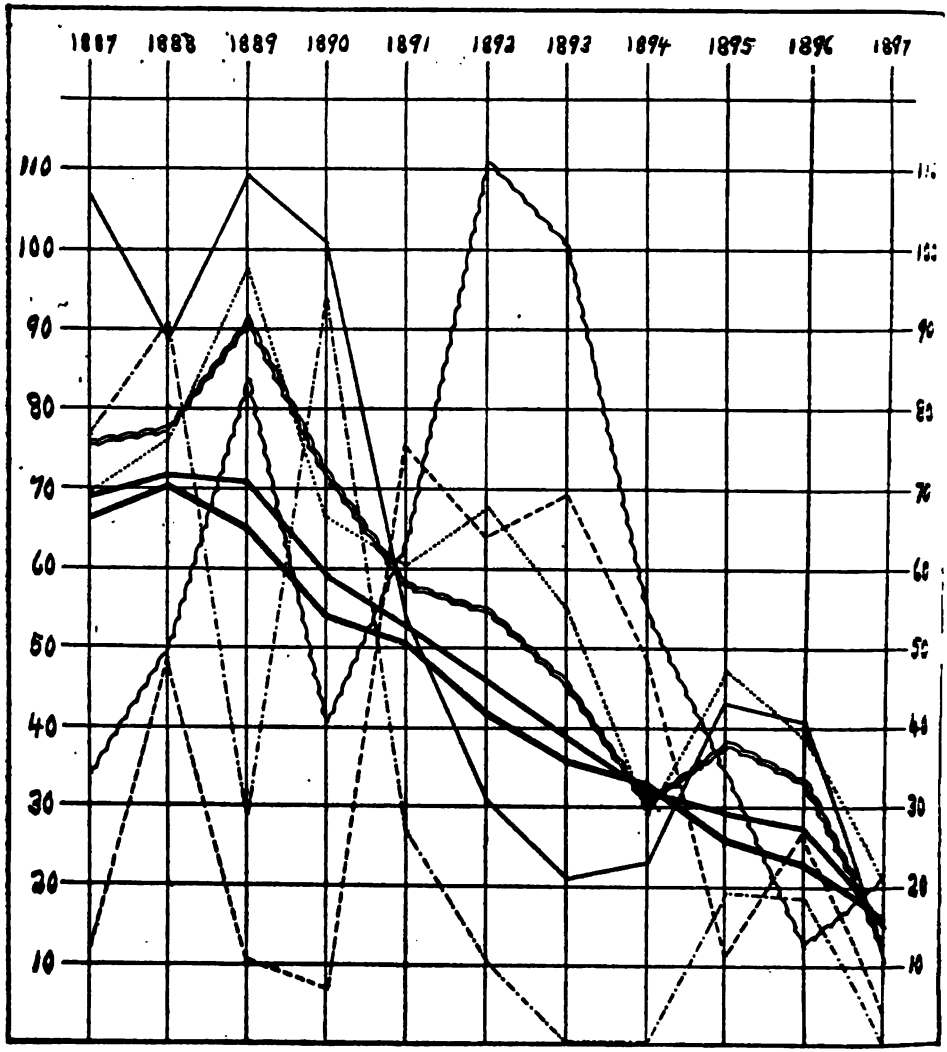

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CHART NO. XI.—CROUP.

ANNUAL DEATH RATE PER 100,000.

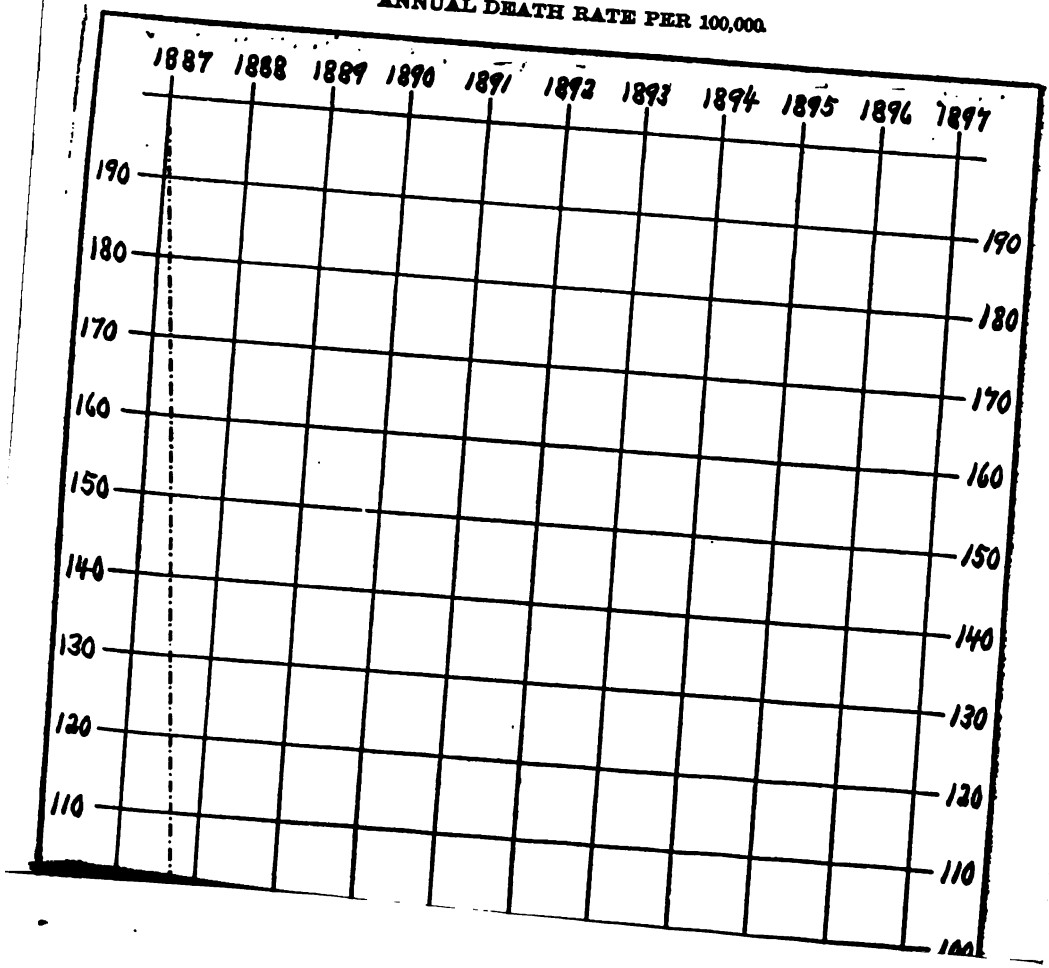

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CHART NO. XV.—TUBERCULAR DISEASES.

ANNUAL DEATH RATE PER 100,000.

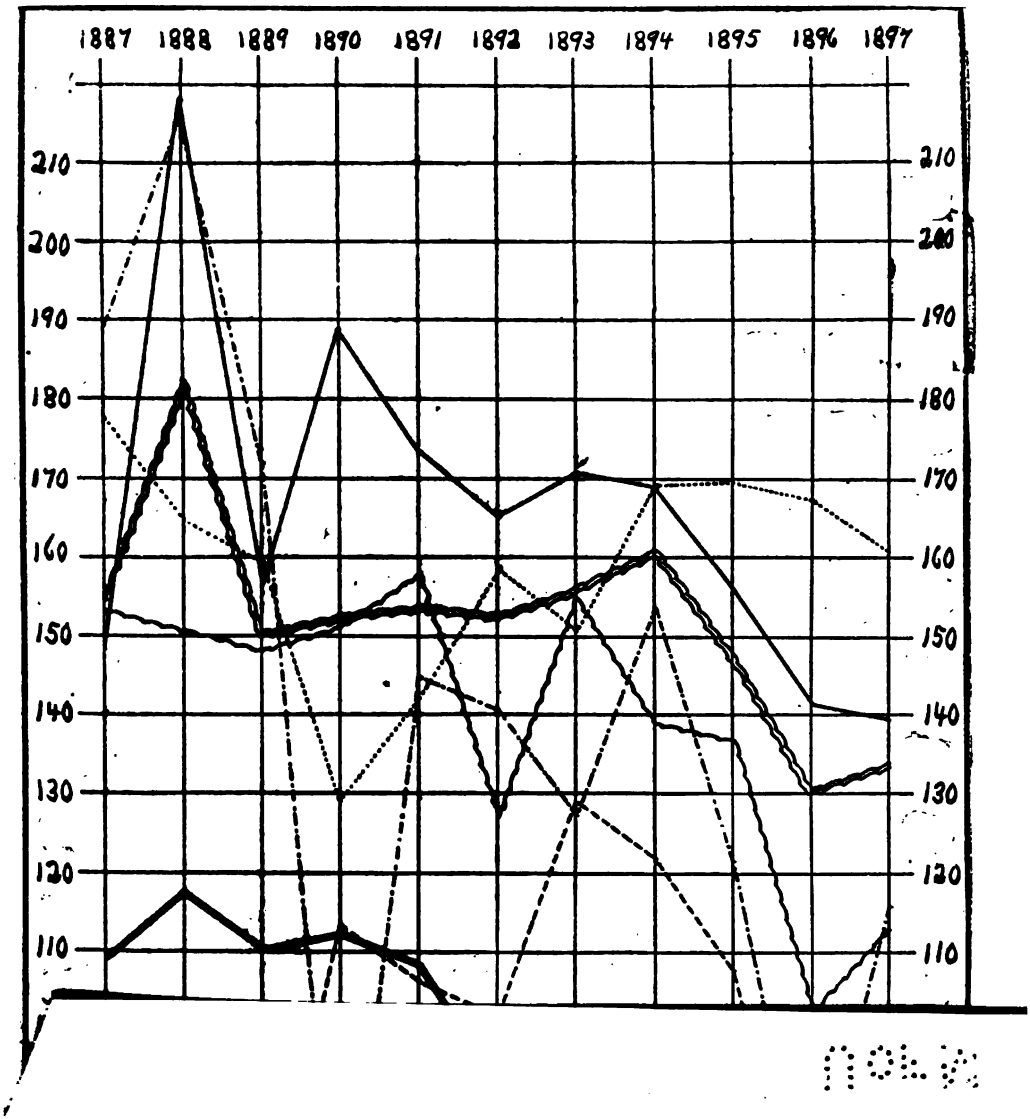

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CHART NO. XVI.—DIARRHŒAL DISEASES OF CHILDREN.

ANNUAL DEATH RATE PER 100,000.

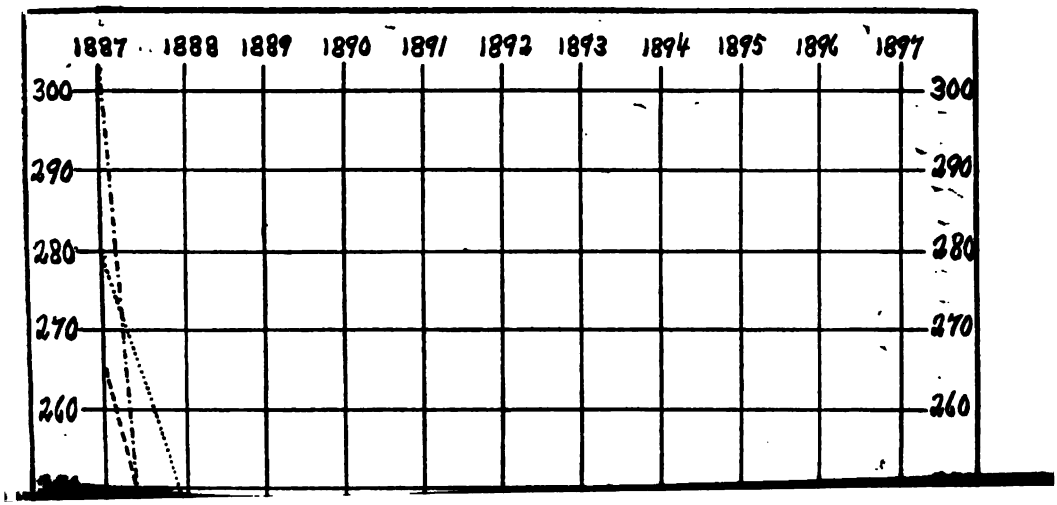

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CHART NO. XVII.—PNEUMONIA.

ANNUAL DEATH RATE PER 100,000.

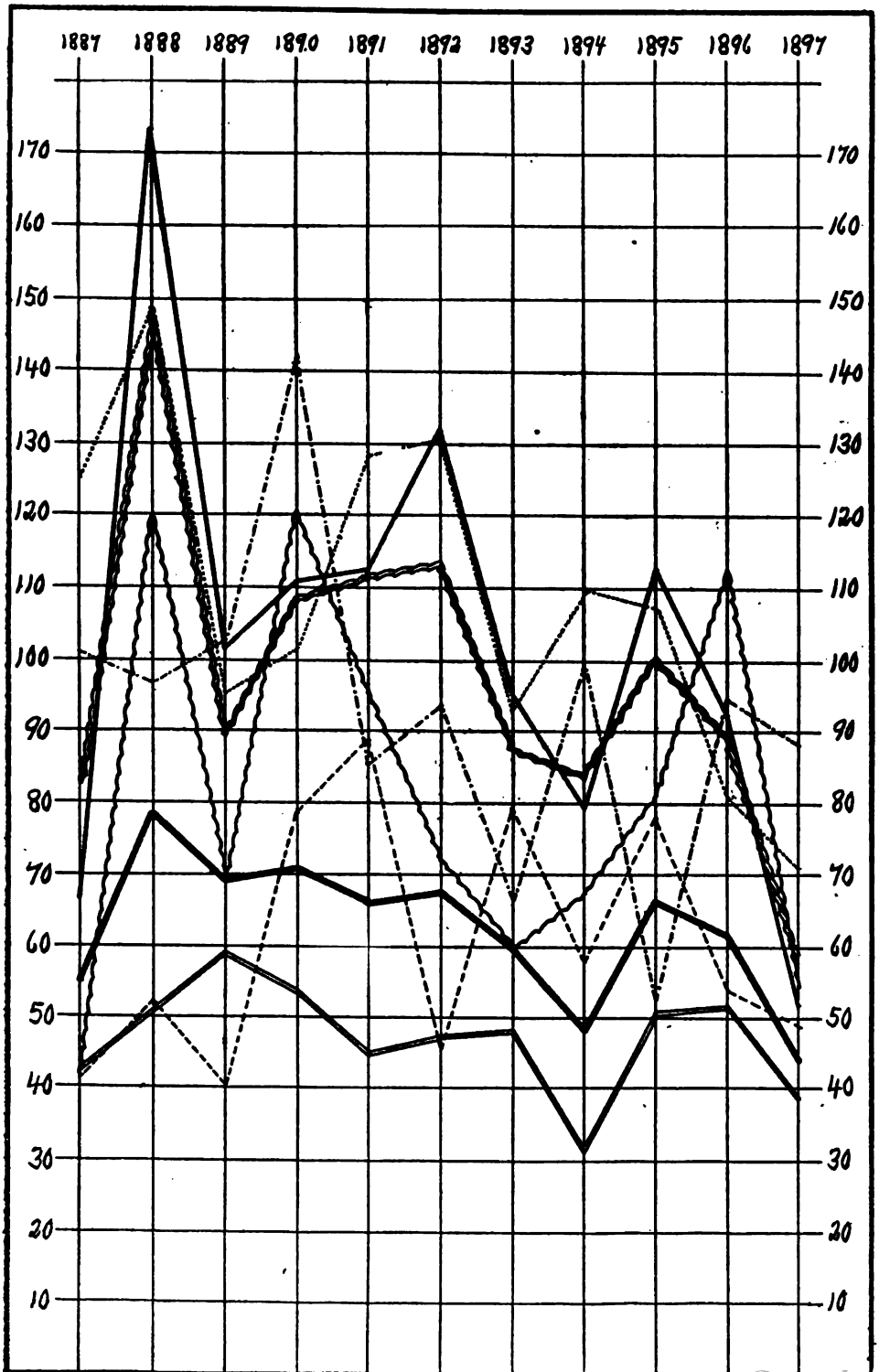

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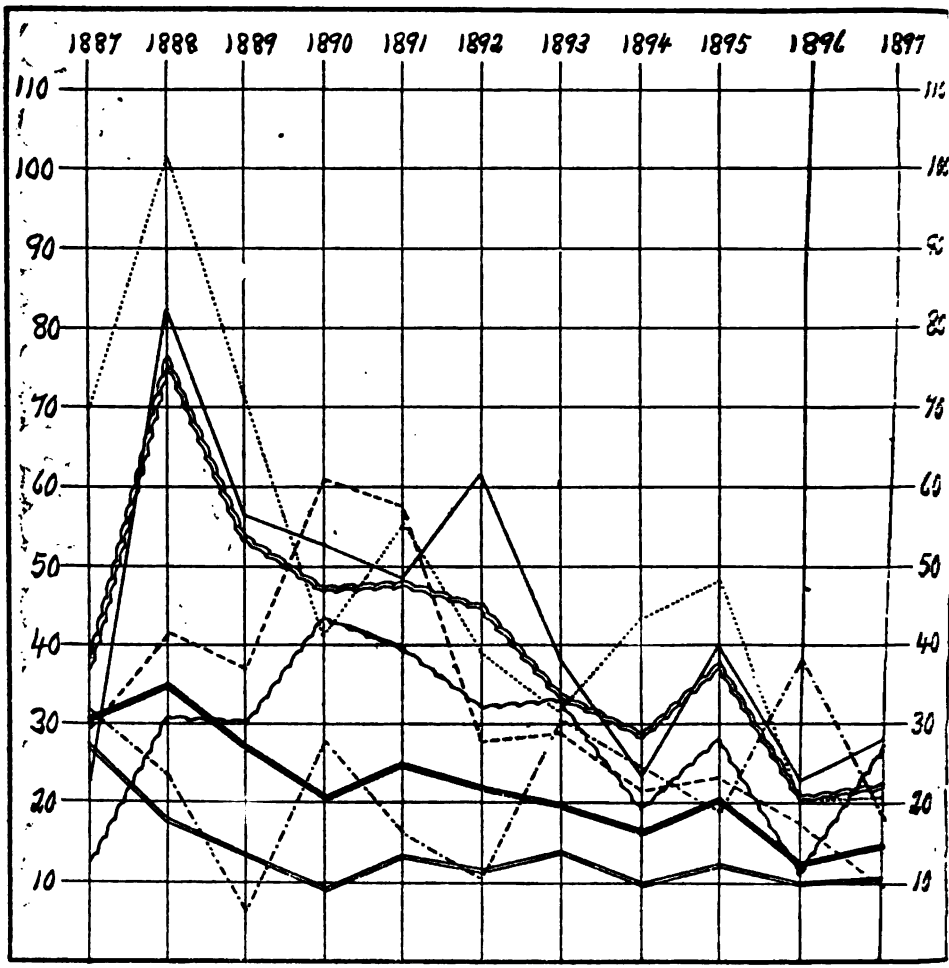
CHART NO. XVIII.—BRONCHITIS.

ANNUAL DEATH RATE PER 100,000.



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REPORT

OF THE

BACTERIOLOGICAL LABORATORY

FOR THE

QUARTER ENDING DEC. 31, 1898.

GENERAL SYNOPSIS OF THE WORK DONE DURING THE YEAR 1898.

In the present report it seemed desirable to give not only the list of examinations made as a routine for the past quarter and those in the nature of special researches, but to compare the year's work with that done during the years 1896 and 1897. Though there is an increase in the amount of work done as shown by the numbers of examinations made, these numbers cannot be taken as an accurate index, since routine examinations, although requiring some time, are not nearly so wasteful of it as are sundry examinations, the results of which may be extremely unsatisfactory. In an estimation of what has been accomplished during the past year, certain happenings must not be lost sight of, as their influence upon the apparent work has been marked. Amongst these may be mentioned:

(*a*) The cessation by this laboratory of those routine examinations of specimens upon the results of which the health board of Minneapolis might determine the necessity for imposition or abandonment of quarantine.

The work of examining blood for the typhoid reaction and sundry investigations of interesting or obscure cases, such as cerebro-spinal meningitis, etc., have been, however, continued, since they had no bearing upon public health under the present regulations of the city and constituted work of a decided research character.

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(*b*) The outbreak of typhoid fever at Camp Ramsey in the Fifteenth Regiment, Minn., U. S. V., afforded a most excellent opportunity of fairly testing the value of the blood reaction, of observing the methods of infection by *B. typhi abdominalis*, and of studying camp sanitation generally.

The huge number of cases occurring simultaneously and causing so much work to the regimental physician; the inability to obtain reliable histories as to the possibilities of infection accorded the soldiers where they had so recently come together and were allowed to visit freely the neighboring cities; and the scattering of the cases owing to the lack of camp hospital facilities,—prevented anything like the keeping of systematic records of clinical data by the different physicians through whose hands the cases passed, and it has been impossible to obtain even that data which was collected at the time. This has made the large amount of work done by the laboratory of very much less value.

The small size of the laboratory force and the impoverished condition of the board rendered it impossible to cope with the work at all from the point of view of a proper bacteriological examination of the excreta of these 300 patients for comparison with the results of the blood reaction, and of a thorough systematic investigation of all the materials through which the infection might have been transmitted.

The request of the medical board at Washington for a full report upon the epidemic cannot be met in such a fashion as is becoming to this board, for which, though it is to its discredit, it cannot be blamed by those in a position to know.

(*c*) The investigation of the condition of affairs at the State Public School at Owatonna, which is at once a matter of the greatest importance to the inmates of the school and the state at large, and one which affords an almost unique opportunity for the study of diphtheria and the means for its detection and eradication.

Constant efforts on the part of the authorities of the school based upon data afforded by bacteriological examination in this laboratory for the past two and a half years having failed to rid the school of the infection, it had been decided by this board to send some one from the laboratory to collaborate with the authorities at Owatonna. This was found to be impossible, owing to the illness of the director of

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the laboratory, until the quarter just passed, when it was begun.

A full account of it is given later in this report.

SYNOPSIS OF EXAMINATIONS FOR 1898 COMPARED WITH THOSE OF 1897 AND 1896.

Examinations.	Quarters 1898. First.	Second.	Third.	Fourth.	Total 1898.	Total 1897.	Total 1896.	Total Three Years.
Diphtheria (including Owatonna)	909	*530	532	2,491	4,462	2,407	923	7,792
Typhoid	472	*182	986	225	1,865	2,408	62	4,335
Tubercle	29	9	....	2	40	141	84	265
Water	1	....	5	5	11	29	9	49
Glanders	3	1	....	2	6	16	.....	22
Anthrax	...	....	....	.....	.....	8	.....	8
Swine plague (hog cholera)	...	....	....	1	1	9	2	12
Rabies	6	1	2	.....	9	21	3	33
Cerebro-spinal meningitis	...	2	1	1	4	.....	.....	4
Actinomycosis	3	....	....	.....	3	.....	.....	3
Animal inoculations	...	....	....	.....	254	285	13	552
Sundry examinations	**1	1	3	17	22	18	2	42
Totals	1,424	726	1,529	2,744	6,677	5,342	1,098	13,117

NECESSITY FOR A LARGER LABORATORY FORCE AND APPROPRIATION.

The work has grown so enormously that it is getting beyond the power of the present staff to cope with it, and while a great deal has been and is being accomplished along the lines of routine work, and some few things have been done which may be considered of some value scientifically, it too often happens that good opportunities for investigation are allowed to let slip; and where much labor has been expended in beginning and continuing investigations to a point sufficient for diagnosis, etc., they have not been completed sufficiently to be worthy of record as scientific work and likely to bring the greatest possible credit to this state.

The work of organization of the laboratory from total lack of definition of its functions at first in the minds of the board and laboratory staff, and still persisting in the minds of the people throughout the state, has prevented the acquirement of the proper balance between routine and research work. This was probably

*Error in quarterly report.

**Sundry examinations include disinfection experiments; investigation of obscure diseases of animals and men, examining such materials as foods and flies as carriers of infection, as at Camp Ramsey, and of earth, milk, etc., as sources of diphtheria bacilli at Owatonna.

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unavoidable, since this board was the first to establish a laboratory in which not only routine but research work was attempted for a whole state.

The ideal would be to have a staff and appropriation sufficiently large to be able to cope with the greatest possible amount of routine work which could occur, and at the same time follow out those things which seem to be of the greatest importance hygienically. The investigation of matters, such as food or water-borne disease, special epidemics, certain diseases of animals, etc., are to be regarded in the present state of our knowledge really as researches, and should be so treated. It will be necessary, therefore, to have a staff so arranged that some one may go out at a moment's notice to determine, in the first place, the advisability of a full investigation, and to collaborate with the local authorities should it appear advisable.

In the field offered by the state for the scientific investigation of animal disease there is a splendid opportunity for the laboratory, which is to be taken advantage of apparently best by means of a man familiar both with the bacteriological and veterinary work. The request of the director of the veterinary department that the field veterinarian be permitted to spend his spare moments in the laboratory was a matter of special gratification to the laboratory. It would be well worth while to have some one continually in the laboratory who is trained in veterinary medicine, and who might be present to study materials sent in; or, better yet, be sent out to collaborate with the veterinary department of the board or the local authorities, or both, in the field.

FUNCTION OF THE BOARD IN DETERMINING FITNESS OF LOCAL HEALTH OFFICERS FOR THEIR POSITIONS.

As time goes on it will doubtless become a function of the Minnesota State Board of Health to determine the fitness of the health officers for their positions, and before accepting the diagnoses of the bacteriologists, chemists, etc., of local boards of health, to determine their ability for doing such work. A graduate in medicine of the present day is ordinarily no more competent to pose as an authority on the examination of materials, etc., upon the results of which quarantine or public health protective measures are to be based, than he is to become immediately a consulting physician or surgeon or a medical expert. Special training and knowledge is required in both health officers and bacteriologists, which the board should be prepared to inquire into and pass upon, just as in the

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proposed meat inspection legislation provision is made for the proper selection of suitable inspectors, and as in the examination and lincensing of embalmers. Such special training and examination is necessary for those holding the position of health officers in England.

It is hoped ere long that all the large towns and cities may be provided with laboratories, under which circumstances the routine work of this laboratory will be lessened, though never done away with under the present subdivisions of the health board districts.

In Quebec, Dr. Wyatt Johnston, bacteriologist to the Provincial Board of Health, is endeavoring to educate the local health officers, a few at a time, so as to enable them to do their own diagnostic work. Such a "modus operandi" affords a state board of health an opportunity of seeing that its local officers are correctly taught thus far.

BACTERIOLOGICAL EXAMINATIONS AS THE SOLE BASIS FOR QUARANTINE REGULATIONS IN DIPHTHERIA.

The use of the laboratory for determining the necessity for the quarantine of cases of suspected sore throat should be made compulsory throughout the state. As soon as it becomes generally known that by this means the quarantine period may be shortened, and in fact is on the average considerably shortened, people will begin to demand it of physicians. The bacillus is the dangerous element in diphtheria; therefore its presence or absence is the only logical reason for maintaining or releasing quarantine.

By means of the reports sent him from the laboratory and the recording of the results therein contained upon such case cards as are used in the laboratory (see page 447), the secretary and executive officer could daily see what foci of danger as regards diphtheria were known to exist in the state. He could see that at least two negative examinations were obtained before quarantine was released, but would probably require some assistants or inspectors, particularly where cases occurred in the country where no medical man was available. Such inspectors should spend a few days or weeks in the laboratory to learn the possible fallacies in such work and how to guard against them. The necessity for some such assistance and a proof of the success of quarantine based on bacteriological findings is afforded by the following illustration:

About the first of October, 1898, one case of laryngeal diphtheria and several cases of mild "sore throat" developed in the town of Maple Plain. Dr. J. S. Schräder, of Delano, sent a culture from one

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of the cases of sore throat to the laboratory, Oct. 12th, and it showed typical *B. diphtheriae.* Since there was no physician at Maple Plain, and since these cases, with one exception, were so mild as not to require medical attendance, the secretary of the State Board of Health visited the town and took cultures from the throats of several children in each family. One or more of these from each family showed *B. diphtheriae.* Similar results were obtained from the laboratory, and twice by the local non-medical health officer, who had been taught to make the cultures. The bacilli remained in the throats from two to six weeks. Their virulence was tested in three cases and was found to be fully equal to that of cultures from cases with marked clinical symptoms.

The local health officer and quarantined families were quite willing to collaborate and were entirely satisfied, which shows that there would not be universal opposition to such a system of regulation.

Under the present arrangement, where the choice of a time limit or a bacteriological examination is permitted, there will always be room for misunderstanding. The time limit, even as an alternative, is illogical, very often isolating people who do not need it, and less frequently, perhaps, allowing foci of the diptheria contagium every opportunity to spread.

PERSONNEL OF LABORATORY.

The staff of the laboratory remains unchanged, except that owing to the absence of Dr. McDaniel at Owatonna. Dr. Mary B. Damon has been engaged, with the consent of the executive committee, to act as temporary junior assistant bacteriologist for half time. It has also been found necessary to employ Wm. Eckman for five weeks as an assistant to the janitor or helper.

The work at Owatonna, whilst apparently provided for by the presence there of Dr. McDaniel, has thrown, however, extra work, both directly and indirectly, upon the laboratory.

The absence of Dr. McDaniel has, temporarily, put an end to certain of the investigations, partially or nearly completed, of which mention was made in the last quarterly report.

All other investigations hitherto mentioned are still being continued, and certain others are here reported under the separate headings, though all other research work is temporarily rendered subservient to the Owatonna investigation.

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SYNOPSIS OF TYPHOID FEVER EXAMINATIONS, FOURTH QUARTER, 1898.

Place.	October.	Nov'ber.	Dec'ber.	Total.
Anoka	1	2	...	3
Amery, Wis.	...	1	...	1
Buffalo Lake	2	...	...	2
Fort Snelling	1	4	...	5
Grand Rapids	...	1	...	1
Lake City	2	...	...	2
Milaca	1	...	...	1
Milan	1	...	...	1
Minneapolis	54	78	61	193
Montevideo	...	1	...	1
Monticello	2	2	...	4
Morgan	2	...	1	3
St. Anthony Park	1	...	...	1
St. Paul	1	...	...	1
Tracy	1	...	...	1
West Concord	2	...	1	3
Winona	1	...	...	1
Wykoff	2	...	...	2
Totals	74	87	64	225

SYNOPSIS OF DIPHTHERIA EXAMINATIONS, FOURTH QUARTER, 1898.

Place.	October.	Nov'ber.	Dec'ber.	Total.
Albert Lea	13	44	16	73
Austin	2	...	4	6
Avoca	...	1	...	1
Black Hammer	...	...	1	1
Blooming Prairie	1	1	...	2
Chokio	...	...	2	2
Clearwater	2	...	...	2
Crookston	...	...	5	5
Dakota, Minn.	...	...	1	1
Dodge Center	2	2	...	4
Elbow Lake	...	2	5	7
Elmore	...	...	1	1
Faribault	4	...	...	4
Farmington	5	5	1	11
Fulda	...	...	2	2
Hancock	...	1	...	1
Houston	...	...	1	1

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Diseases.	October.	Nov'ber.	Dec'ber.	Total.
Little Falls	...	...	1	1
Maple Plain	24	18	...	42
Marine Mills	...	...	1	1
Minneapolis	2	9	5	16
Mora	7	1	...	8
Morgan	...	1	2	3
Morris	13	15	5	33
Park Rapids	4	17	27	48
*Owatonna (S. P. S)	353	9	...	362
Redwood Falls	...	...	1	1
Rushford	4	11	12	27
Sauk Center	...	1	...	1
Sleepy Eye	...	1	...	1
Spring Grove	1	...	...	1
St. Anthony Park	4	...	...	4
St. Cloud	24	16	4	44
Stillwater	...	...	2	2
Tracy	29	39	5	73
Wabasha	1	...	...	1
Waite Park	...	1	...	1
Waseca	1	...	...	1
Willmar	4	...	1	5
Wykoff	...	1	...	1
Totals	500	196	106	802
*Dr. O. McDaniel, from Nov. 29, 1898, to Dec. 31, 1898				1,689
Whole total for quarter				2,491

SYNOPSIS OF SUNDRY EXAMINATIONS, FOURTH QUARTER, 1898.

Cerebro-spinal meningitis	...	...	1	1
Obscure diseases of horses	1	...	1	2
Glanders	...	...	2	2
Hog cholera	...	1	...	1
Tubercle	...	1	1	2
Water examinations	4	1	...	5
Earth, milk, toys, etc	11	...	...	11
Disinfection investigations	1	...	3	4
Totals	17	3	8	28

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ROUTINE DIPHTHERIA EXAMINATIONS.

A study of the table of examinations will show that the work has not decreased when that being done at Owatonna is included, and excluding this for the quarter it will be found to be much greater than for any other quarter in the history of the laboratory

Patient.....Dr.....address.....

Age. .....sex.....address.....H. O.....address.....

EXAM. NO.	CASE NO.	DAY OF DISEASE.	DATE OF CULTURE.	DIAGNOSIS.	REMARKS.

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in which a similar exclusion is made, even whilst the diphtheria diagnostic work was being done for the city of Minneapolis in this laboratory. A new feature in the preservation of the records of the examination of specimens is the employment of a card of the size and description indicated on page 447.

These cards are filled in daily as soon as examinations are completed, and are an index of the danger of contagion from the case. They are kept in a box, like a card catalogue, alphabetically arranged according to patients' names while such cases are under observation, and make a cross reference to the ordinary filing envelope where the filing is by case number and date.

The necessity for interpreting the diagnosis given has been long apparent, and the plan outlined in Circular of Information No. 2, has been adopted.

The copies of the diagnosis (made in quadruplicate) which go to the local health officer and the attending physician are made upon blanks, on the backs of which are printed the possible interpretations of the diagnosis given. Those copies kept in the laboratory, as well as those sent to the secretary of this board, have not such printing on the back. (See page 190.)

As has before been pointed out, the number of examinations is not an indication of the number of cases of dipththeria occurring in the state, since the bacteriological method is not universally employed for diagnosis. And where the first case is reported upon negatively, further examinations are not asked for nor made. This is often a mistake on the part of the physician, since his method of collecting and forwarding the specimen may have been faulty, when they are evolved by himself, or he too frequently employs boxes for the transmission of specimens which, from the age of the medium contained, are not suitable.

RABIES.

Notwithstanding the fact that no specimens have come in for diagnosis, it must be remembered that the inoculation of a pair of rabbits occurs every ten days in order to maintain the "fixed" virus.

The inoculations begun from the brain of the mad wolf sent in from Cannon Falls last winter (Case No. 26) have been continued through the necessary series of rabbits in order to obtain, if possible, a fixed virus from this source. The incubation of thirteen to fourteen days at first observed became lengthened, and is still much greater than at first.

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The inoculations in these two series are continued in the hope of being able to work out a serum therapy, and to study the relation, if any, of the subcutaneaus inoculation on the development or arrest of infection by means of subdural inoculation.

Dr. Geo. Douglas Head, of the University of Minnesota, is making a count of the blood, particularly in regard to leucocytosis, in the animals used, both before and after inoculation.

CEREBRO-SPINAL MENINGITIS.

Material secured by lumbar puncture in one case of cerebro-spinal meningitis was examined in the laboratory during the past quarter. Only one pair of diplococci were found in the several coverslip preparations direct from the fluid. Cultures and guinea pig inoculations have been made, and the matter is still under investigation.

GLANDERS.

Dec. 18, 1898, material for histological and bacteriological examination was obtained from a horse and a mule killed at the State Experimental Station, on a diagnosis of glanders by the director of the veterinary department of this board. *B. mallei* was obtained in purity from the cervical glands in the first cultures made, and by guinea pig inoculations from the same substances. The histological material has not yet been examined.

EXAMINATION OF URINE.

On Dec. 20, 1898, there was received in the laboratory a specimen of urine from Dr. A. W. Abbott, of Minneapolis. The somewhat unusual clinical history suggested that this might be an interesting case to investigate concerning the diagnosis between *B. tuberculosis* and the smegma bacillus, about which there has recently been much discussion, and an examination was undertaken. The patient, a young woman, though in fairly good general health, had shown pus in her urine for more than ten years. This had been examined microscopically a number of times for tubercle bacilli, but always with negative results. The pus had been shown to come from the left ureter only. The specimen brought to the laboratory had been drawn with a catheter, with ordinary aseptic precautions, into a sterile flask, and kept in a cool place until examined, twenty-four hours later.

After centrifugalizing, four smears were stained in the ordinary way for tubercle bacilli, and three for smegma bacilli, with-

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out the use of alcohol. Only very numerous bacilli, slightly larger than tubercle bacilli, were found. These were quite uniform in size and shape, and invariably stained blue.

Cultures in various media all gave a heavy and pure growth of a bacillus, which, on further examination, proved to be *B. coli communis.*

One guinea pig inoculated subcutaneously with the urinary sediment died on the fourth day, and from the seat of inoculation *B. coli communis* was isolated in pure culture.

Another specimen of urine has been asked for, and further examinations will be made to determine whether or not there be a causative relation between *B. coli communis* and this chronic case of pyelonephritis.

SUBDURAL INOCULATION OF DIPHTHERIA BACILLI.

The studies on the subdural inoculation of diphtheria bacilli which were begun last winter, and laid aside in the spring on account of the pressure of other work, have been recently resumed. As a preparatory step, the virulence of several of the stock cultures of *B. diphtheriae* in the laboratory was tested by subcutaneous inoculations into guinea pigs. In the three that were used a year ago no change was observed.

When the virulence by subcutaneous inoculation had been determined, guinea pigs were inoculated subdurally by the ordinary trephining operation, in varying minute doses. One of the animals, on the eighth day, developed a posterior paralysis, which rapidly ascended and produced death in about seven hours from its onset. At the autopsy, marked general meningitis was present, and *B. diphtheriae* was recovered in pure culture from the surface of the meninges.

The next step will be the subcutaneous and subdural inoculation of rabbits with the diphtheria organism. Preparatory to this, Dr. Geo. D. Head, of the State University, is making blood counts on the normal rabbits, which it is proposed to use for the experiments. These counts will be continued after the inoculations are made, in order to determine the presence or absence of leucocytosis.

DISINFECTION EXPERIMENTS.

DISINFECTION OF SCHOOL BUILDINGS AT ALBERT LEA, MINN.

The following abstracts are from the correspondence relating to the tests of disinfection of the school buildings at Albert Lea, Minn.:

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Letter to Dr. von Berg from the director of the laboratory of the State Board of Health, dated Nov. 7, 1898:

"Dr. Bracken informs me that you are supervising the disinfection of the Albert Lea schools, and wish for test materials from the laboratory, in order to determine the efficacy of the methods employed. We are accordingly sending you by express this afternoon outfits numbered one to forty-nine. They consist of glass tubes, five-eighths inch in diameter, and three to four inches long (open at both ends), (a) in which the ends are plugged with cotton wool, (b) over the ends of which four thicknesses of gauze are tied.

"In the tubes, which have been sterilized, are cotton threads which have been dipped into cultures *B. prodigiosus* and *B. subtilis*. The short ones are *B. prodigiosus* and the long ones *B. subtilis*. In using these outfits for your tests, I would suggest that:

"(1) In all rooms operated upon, one tube he placed in the following way: ——, allowing it to lie upon its side, the cotton wool plugs may be withdrawn and left close to the ends of the tube from which they have been taken. This will determine the action of the materials directly upon the threads.

"(2) In certain of the other rooms to be selected by you

"(*a*) Place the tubes just as they are (of course, after unwrapping the paper). This will determine whether the agent employed is capable of passing through cotton wool or not.

"(*b*) The tubes covered with the gauze may also be placed *just as they are* after unwrapping.

"In certain of the rooms you will be able to obtain information as to whether the agent employed permeated the four thicknesses of gauze. In making your returns to us with the numbered outfits, please give us the following data, in full, and as much more as seems to you desirable: The size, situation, number of windows in, character of the walls, floors, etc., of the room; the amount of material employed, and how long it was allowed to act.

"We shall probably not be able to report for three or four days after the receipt of the tubes, as the bacteria may be affected in such a way as to cause the growth to be slowed, though they may not have been absolutely killed, and we would wish time to settle this matter. Of course, in those tubes from which the plugs have been removed by you it will be necessary for you to replace them and to wrap again in paper. Wrap each of the outfits in paper, so as to prevent breakage and possible accident in the removal of the plug in transit. Of course, you will see the necessity of our know-

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ing the number of the tube or tubes used in any given room in order to be able to report.

"I shall be extremely glad to receive suggestions and further information than that asked for from you."

* * * * * * * * *

From Dr. J. P. von Berg to the Director of the Laboratory of the State Board of Health:

"Following you will find a short description of the rooms and method of disinfecting the school buildings at Albert Lea, Minn.:

"*Central brick building.* Contained eight rooms and sixteen closets. Each room, with two closets opening into it, contained 14,518 cubic feet. In each of these eight rooms, and adjoining closets, forty to fifty yards of muslin were suspended after one gallon of the forty per cent solution of formaldehyde had been sprinkled upon it. The muslin was removed from all the rooms after twenty-four hours. The doors and windows were kept closed. It was a very difficult task to remove the muslin, as the gas was so penetrating. One description answers for all the eight rooms:

"Two sides of each room are outside walls. In each of these sides are three windows (opening 3x10½ feet). The sash fitted rather tightly in the frames. At the dividing sash 'wipers' waste' (cotton waste) was crowded in. The storm sash was put on each window. The doors leading into the halls from closets were all stuffed with wipers' material. The doors through which the operator entered were provided with weather strips and were tightly closed after the muslin was suspended. The walls in the rooms are hard finish on ceilings and sides, except where wainscoting was placed. This is four feet high in the rooms, excepting on two sides where blackboards are. These (the blackboards) reach down within two feet of the floor. In the closets the wainscoting is six feet high. The floors are hard pine and water tight. The tubes were placed and remained from two to five days in the rooms.

"Halls up and down stairs had a capacity of 33,026 cubic feet. At the front entrance were two large doors which could not easily be rendered gas tight. Aside from this, the two halls were practically as tightly closed as the rooms.

"Two and three-fifths gallons of the forty per cent solution of formaldehyde was sprinkled on one hundred and twenty-five yards of muslin which was suspended in the two halls and allowed to remain there forty-eight hours.

"*Frame building.* This had a capacity of 75,672 cubic feet, and nearly six gallons of the formaldehyde solution was used on two hundred yards of muslin.

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"In this building the windows do not fit as snugly as in the brick building. The storm sash was only fitted to the west side of the southwest rooms up and down stairs. The windows on the first floor were 3x8 feet, and on the second floor were 3x6½ feet. As the whole building was disinfected at one time, the outside walls only permitted the gas to escape. (More recently, Dr. von Berg says: 'I have since looked the building over, and believe it nearly impossible to disinfect it. The floors are not nearly as tight as in the brick building, and there are spaces around the window frames. The odor of the gas escaped much sooner (in one-fifth the time) than from the brick building, showing that the walls were not so tight. The wind blew rather hard from the southeast on the days when the frame building was under disinfection. You will notice that the tubes in this building were, with but few exceptions, placed near doors or exposed walls.')

"*Water closet.* I also sprinkled one-half gallon on cloth and suspended in water closet, which has rough plastered walls and ceiling and cement floor. Space 6,880 cubic feet; one-half gallon of material. Did not open room for forty-eight hours.

"*Arrangement of saturated muslin, etc.* The muslin was supplied with rings on both ends. Nails were then driven six and one-half feet from the floor in window and door casings, and upon these the rings were slipped. The strips were only one yard wide. In the center were two sticks placed to relieve the strain some from the rings and nails.

"You may find a fly in one tube. This was in the tube No. 19 when I gathered them up. The windows had been opened some for two days, so that it may have gotten in after disinfecting. It was alive when I took it up.

"The tubes Nos. 10 and 28 were placed twice by mistake. I marked on map which position they first occupied.

"The amounts used in the three buildings were as follows:

"In the brick, one gallon of formaline to 15,733 cubic feet.

"In the frame, one gallon of formaline to 9,000 cubic feet.

"In the water closet, one gallon of formaline to 13,760 cubic feet.

"You will see from the above that the brick building did not receive the same relative amount of the liquid."

(A long written description of the position in the rooms occupied by the tubes of test materials can be here omitted, since their position is indicated by numbers on the map which follows.)

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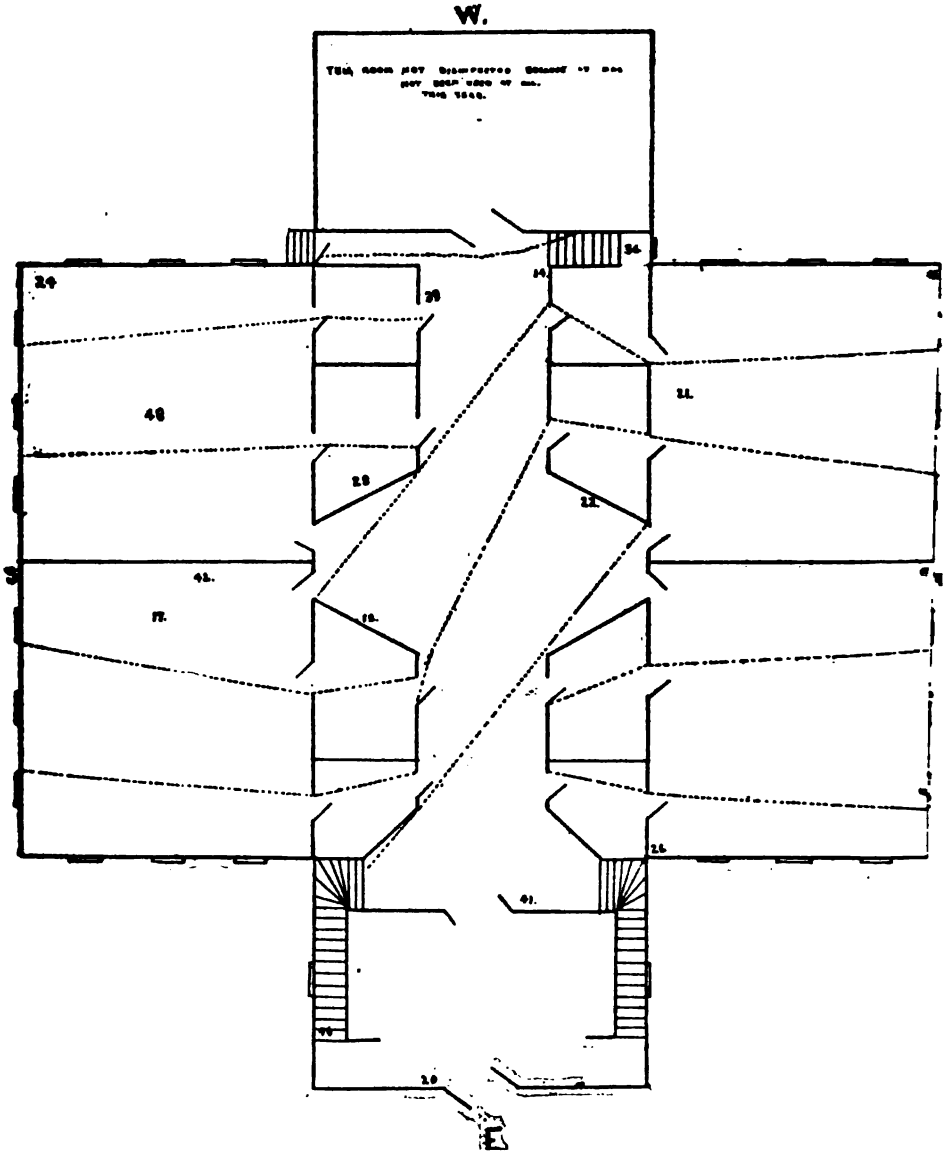
BRICK BUILDING—FIRST FLOOR.



NOTE.—Distribution of muslin wet with formaldehyde is indicated by dotted lines. Numbers indicate the position of the test materials (tubes). For particulars as to height and environment, as also of effects, see accompanying table.

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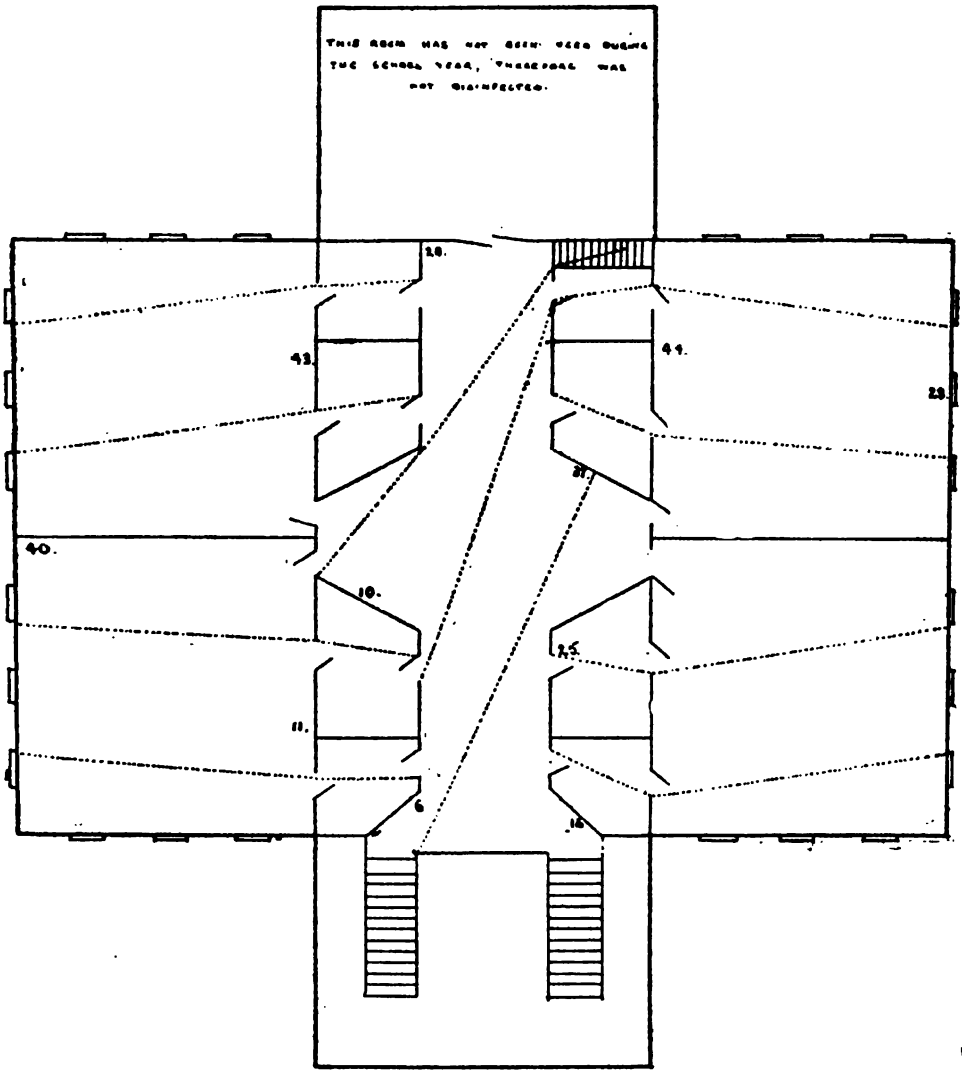
BRICK BUILDING—SECOND FLOOR.



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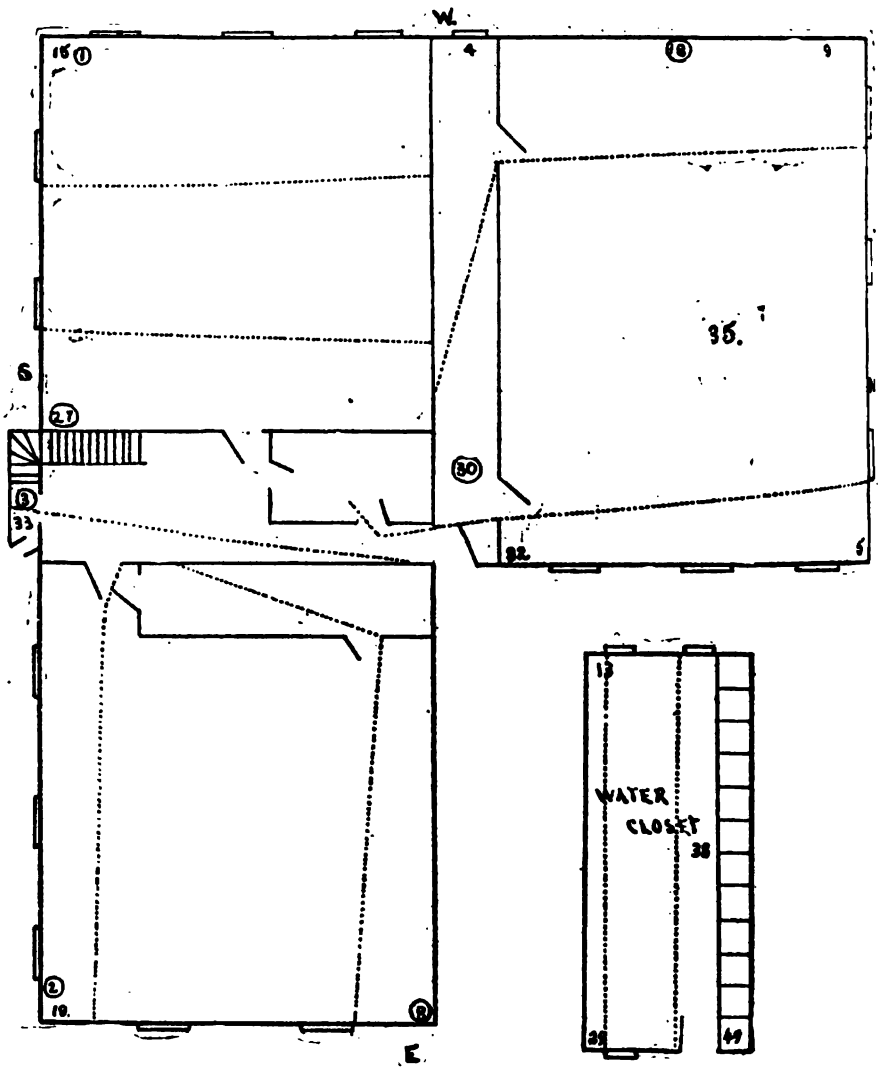
FIRST AND SECOND FLOORS OF FRAME BUILDING.



NOTE.—The plans of both floors of this school building are the same. The numbers inclosed in circles indicate the position of test material (tubes) on second floor; the plain numbers indicate the position of test material (tubes) on first floor.

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EXPLANATION OF TERMS.

Number of Tube.	Kind of Tube.	Results as Indicated by Growth of Exposed Threads in Media.		Disposal of Tube in Room, Environment, Etc.—Re.
		B.—Subtilis.	B.—Prodigiosus.	
1	?	Good	Delayed	On a stand.
2	B	Good	Delayed	On floor.
3	B	Good	None	On floor.
4	A	Light	None	On floor.
5	A	Good	None	On floor.
6	A	Delayed	Delayed	On floor.
7	?	Delayed	Delayed	On teacher's desk.
8	A	Delayed	None	On floor.
9	A	Delayed	Delayed	On shelf under blackboard.
10	A	Delayed	None	On floor. } Exposed twice.
	B	Delayed	None	On window sill }
11	A	Delayed	Delayed	On platform.
12	A	Delayed	Delayed	On floor.
13	A	Delayed	Delayed	On floor.
14	A	Delayed	Delayed	On floor near outside door.
15	B	Delayed	Delayed	On floor.
16	A	Good*	Delayed	On floor.
17	A	Good*	Delayed	On floor.
18	A	Good*	Delayed	On floor under window.
19	A	Good*	Delayed	On floor (contained live fly).
20	B	Good*	Delayed	On floor.
21	B	Delayed	Delayed	On teacher's desk.
22	A	Delayed	Delayed	On floor.
23	B	Delayed	Delayed	On window sill.
24	A	Good	None	On floor.
25	A	Delayed	Very slight	On floor.
26	A	Delayed	Delayed	On floor.
27	A	Delayed	None	On floor.
28	A	Delayed	None	On floor. } Exposed twice.
	B	Delayed	None	On floor. }
29	B	None	None	On floor.
30	A	Delayed	None	On floor.
31	B	Delayed	Delayed	On floor.
32	B	Delayed	Delayed	On floor.
33	A	Delayed	None	On floor near outside loosely fitting door.
34	B or C	None	None	On floor.
35	B	Delayed	None	On desk in center of room.
36	C	None	Delayed	On platform, back stairs near a window.
37	B	Delayed	Delayed	On floor.
38	B	None	None	On floor.
39	B	None	None	On floor.
40	C	Delayed	Delayed	On table.
41	C	Delayed	Delayed	On floor near door.
42	C	Delayed	None	On floor.
43	C	None	Delayed	On desk.
44	C	Delayed	Delayed	On teacher's desk.
45	A	Delayed	Delayed	On floor.
46	C	Delayed	Delayed	On platform of front stairs.
47	B	Delayed	Delayed	On floor.
48	C	None	Delayed	On desk.
49	C	None	Delayed	On floor.

A Indicates tube (⅝ inch in diameter and 3 to 4 inches long) that was open at both ends.
B Indicates tube that was loosely plugged with cotton wool.
C Indicates tube, over each end of which four thicknesses of muslin were tied.
* The *subtilis* threads in tubes Nos. 16, 17, 18, 19 and 20 were all planted on same agar plate, upon which was a complete overgrowth, probably due to the fly in No. 19, so that it was impossible to say whether all or only the control thread gave rise to growth.

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Abstracts from letters to Dr. Von Berg from the director of the laboratory:

"Nov. 17, 1898.

"I herewith return you the description and maps of the school buildings which you have been recently disinfecting. As you will see, we have filled in at points indicated by your crosses the numbers of the tubes which occupied the specified positions.

"The short threads which contained *B. prodigiosus* were planted on potato medium, but have not yet developed, so that the results of the experiments as noted in red ink opposite the numbers on the maps refer only to the subtilis threads which have been planted upon agar. Should any developments take place in those cultures in which we have written 'no growth,' we can later correct it; and we will report later upon the prodigiosus specimens which may have been killed here, owing to the great drying to which they have been submitted.

"As you will see, even from the subtilis cultures alone, you have fairly well succeeded in sterilizing the brick building and water closet, though the frame building will have to be done again."

"Nov. 21, 1898.

"As I hinted might be the case, a great many of the planted threads which at the time that I wrote you the last letter had shown no development have since given growths. It will therefore be necessary to modify the report as already given you."

(A synopsis was given in this letter, all of which is, however, contained in the table and plans which follow.)

It would appear from the final results of the tests out of the forty-nine tubes exposed that both organisms were killed in but four; *B. prodigiosus* alone in twelve; *B. subtilis* alone (?) in four; that the growth was delayed in all tubes (in which it was not entirely prevented) of *B. prodigiosus;* in twenty tubes of *B. subtilis;* and that it was apparently unaffected at all in nine tubes of *B. subtilis.*

The disinfection was less insufficient in the brick building and water closet than in the frame building. In all, very much larger amounts of the formalin should have been evaporated, and the openings in the frame building more tightly closed by wet newspapers or some similar device.

While it may not be necessary to well-kept private rooms to use an exces of disinfectant sufficient to kill all the organisms within the rooms, but instead follow the plan adopted by Dr. Wyatt Johnson, of Montreal, of disinfecting very thoroughly under a tarpaulin

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all articles which probably have been infected, and using much smaller amounts of the gas in the body of the room, yet it would seem wise, in crowded living apartments and in public buildings, to use enough gas to kill all the ordinary pathogenic bacteria, even when they are covered by thin layers of dirt.

The great amount of pains taken by Dr. von Berg in doing the experiments and in furnishing full and accurate data and maps have been much appreciated by the laboratory.

SULPHUR FUMIGATION OF BUILDINGS AT STATE PUBLIC SCHOOL, OWATONNA.

On Nov. 15, 1898, Dr. J. H. Adair, of Owatonna, disinfected the general hospital building at the State Public School by means of sulphur fumigation.

As a test of his work, he exposed in the rooms five serum tubes which he had previously inoculated from the throats of children in the school. At the same time he also inoculated control tubes from the same children which were not exposed.

All the tubes were sent to the laboratory for examination. The controls all gave good growths of staphylococci, and in some instances also of *B. diphtheriae*. The exposed tubes showed no growth whatever after eight days in the incubator. Inoculations made on fresh serum from the original tubes forty-eight hours after their exposure also remained sterile.

It should be mentioned that the sulphur fumigation was preceded by steaming, and was sufficiently vigorous to destroy all exposed paint.

These experiments, the results of which are in very marked contrast to those in Albert Lea, are not, however, scientifically accurate, since the bacteria exposed (probably few in number, since only those which by sticking to the swab and being transferred to the medium were exposed) were upon moist serum. This serum was presumably changed in reaction by the sulphur dioxide, and had therefore become an unsuitable medium; and although the cultures were afterwards resown on fresh serum, the bacteria were probably exposed to sulphurous acid and moisture for many hours, i. e., more than two days.

Dr. McDaniel has been making systematic tests in the different cottages as they are prepared to receive clean children by exposing various pathogenic bacteria in different ways to the disinfectant. The test objects and notes of the situation of the test objects and other details are sent to this laboratory for working out. All notes

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were, however, unfortunately returned to Dr. McDaniel some days ago, and the results of these experiments cannot here be made known.

SUNDRY DISINFECTION EXPERIMENTS.

The systematic test of various formaldehyde disinfectors conducted by Dr. Geo. Gray last spring have been compiled, and are now undergoing revision with a view to their early publication. With the results of these experiments, however, the members of the board are, in the main, familiar. It was hoped that these might have been ready for publication in the biennial report of the board for 1897-1898, but it was found impossible.

Dec. 23d, et seq., a trade preparation purporting to be a mixture of NaClO, $MgCl_2O_2$, $CaCl_2$, O_2, KClO, KBrO, NaIO; and $NaHSO_2$ was received from the agent, accompanied by a recommendation from the Philadelphia Bacteriological Laboratory and others as to its efficiency as a germicide. In view of the pointed statements by reputable people concerning the preparation, an informal examination (of which no report other than to this board was contemplated nor made) was undertaken, contrary to the policy of the laboratory. Eighteen tubes of sloped serum (containing two to three c. c. each) were sown over the entire surface with *B. diphtheriae* and grown twenty-four hours in the incubator.

The tubes were then divided into two series of nine each. One series was treated with the undiluted preparation, and the other series with the solution diluted with four times its volume of distilled water. From seven to ten c. c. of the solution was poured into the tubes containing the serum cultures, completely covering the bacteria. The tubes were then allowed to stand for one, three, five, ten, twenty, twenty-five and thirty minutes, and two hours, respectively. The solutions were then poured off and each culture thoroughly washed with seven to ten c. c. of sterile bouillon. Subcultures on serum were then sown and incubated for twenty-four hours. All those sown from the cultures which had been exposed for the various times stated above to the diluted preparation, and all those from cultures exposed to the full strength preparation for periods from one to twenty minutes, grew quite as luxuriantly as the controls which had not been exposed at all. Those from the cultures which had been exposed to the undiluted preparation for twenty-five and thirty minutes did not show quite as abundant a growth, while that from the cultures exposed for two hours to the undiluted preparation presented only a faint growth.

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In the above experiment the dead organic matter present in the serum probably combined with and neutralized some of the liberated chlorine, but when the relatively large amounts of the solution used and the unprotected thin surface culture of the bacteria are considered, it must be concluded that the material tested had very little value as a germicide.

A local dentist, whose "recommendation" appears in the pamphlet issued by the manufacturers of the preparation, states that he did not write the recommendation in question, but that after a cursory trial of the material on three or four patients he informed the gentleman who had given it to him that it seemed to him to be "all right." From this was concocted the formal printed statement.

This examination raises the question whether the State Board of Health should occasionally examine proprietary and other drug preparations on sale in the state, and use the adverse results in admonitions to the manufacturers or in printed statements.

INVESTIGATION AT THE STATE PUBLIC SCHOOL

During the past two and a half years the laboratory has been making routine examinations of specimens from the throats of the inmates of the school for the purpose of determining the presence of *B. diphtheriae*. A large proportion of the children were found to be infected; and though the conditions have never been at any time alarming, this general infection, together with the occurrence of occasional mild and more rarely severe or fatal cases of diphtheria, constituted a constant menace to the health of that institution directly, and indirectly to the state at large, since the children are constantly being sent to homes throughout the state.

The isolation of the children during the time that the throat was infected, irrespective of the presence or absence of clinical symptoms, has been, as far as practicable, carried out; and the throats of new arrivals have been examined, and two negative reports of their freedom from *B. diphtheriae* obtained before they were assigned cottages.

During the last summer the number of those in whose throats *B. diphtheriae* was found was reduced at one time to nine, who were all confined together in an isolated building.

Just to make certain that all was right, however, the attending physician, Dr. Adair, went carefully through the various cottages to which the supposedly germ-free children had been sent, with the surprising results that in some cases fifty to sixty per cent of the children were found to be infected. The occurrence of some clin-

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ical cases of diphtheria about this time gave additional cause for alarm.

On the recommendation of the executive committee and the executive officer, the director of this laboratory went down to Owatonna on the morning of Oct. 27th, and remained until the next evening.

The condition of affairs was such that any or all of the children might have been infected, since, owing to the fact that such a large percentage had the bacillus of diphtheria in their throats, it was impossible to keep those infected from those bacteriologically clean, more especially since nearly all were in apparently perfect health. How this general infection had come about was the important matter, as only by such a knowledge could steps be taken to rectify it and prevent future trouble.

After a former visit, the opinion had been given that direct throat to throat infection might explain the condition of affairs in this school, whether such were the only factor or not. It had also been recommended that individual isolation be practiced, strictly, since it seemed probable that where several quarantined children were confined together in the same room between the time of the taking of the specimen and the receipt of the laboratory report thereon opportunity had been afforded for infection from some of the other inmates in whose throats *B. diphtheriae* existed. Tables of examinations of children so confined for a long time had shown an alternation of positive and negative results seemingly not otherwise to be explained. The children known to be infected were confined in the General Hospital, the Quarantine Hospital and Cottage II., while it was not known how many of the other children were infected day by day.

It was a matter of great interest to see the line of children in the General Hospital, all perfectly well so far as appearances went, marching demurely up to have their throats and noses sprayed or their "cultures taken," after which their play was resumed with as great vigor as before.

As there seemed to be some possibility of connection between the digging of a trench for the laying of steam-heating pipes to a new school house, then in process of completion, and the occurrence of the clinical cases which developed at the time, and as such a coincidence had happened before, it was deemed advisable to collect samples at different depths by digging down in the earth which had been replaced over the steam pipes.

Four samples were thus collected, and samples of water and milk from the General Hospital and Quarantine building were ob-

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tained, and cultures were made from a mouth organ, Jew's harp, tin box cover, iron toy, wooden building block, etc., with which the children were playing. Two children were noticed in whom there seemed to be a chronic inflammation of the nose, with muco-purulent discharge. Cultures were made from the material escaping from the nostrils.

Plans of all the buildings, a map of the grounds showing distances apart and relations of the buildings, as well as photographs, were furnished by the authorities and brought up to the laboratory for demonstration of the state of affairs in a report to the executive committee. These maps, plans, photographs, etc., will be available on the day of the meeting for the inspection of the members of the board. The map shows location of site where earth was collected.

Investigation of the materials collected resulted as follows:

(*a*) Smear from the nose of Fred Helmer, who had chronic nasal discharge; *B. diphtheriae* obtained.

(*b*) Smear from the nose of Geo. Benz, who had chronic nasal discharge; *B. diphtheriae* obtained.

(*c*) A wooden building block; a few suspicious bacilli observed.

(*d*) Mouth organ; a few "*B. Owatonnae*"* seen.

(*e*) Jew's harp; very many "*B. Owatonnae.*"

(*f*) Small iron toy cart; nothing suspicious observed.

(*g*) Small tin box cover; a very few "*B. Owatonnae.*"

(*h*) Cover of milk can in the refrigerator in kitchen of General Hospital building, after scalding of can (not cover); a few suspicious bacilli, staphylococci, and large spore-forming bacilli found.

(*i*) Milk from same building (two drops inoculated into serum tube); staphylococci and streptococci found.

(*j*) Milk dipped with teaspoon from a bowl on table for dinner in dining room of Quarantine Hospital (such milk is brought in any one of a number of cans from the barn at 6:30 a. m., and kept standing on the porch to keep cool); thirty c. c. were taken in a sterile-plugged bottle at 12 noon, kept chilled until 8:30 p. m. same day, when it was placed in incubator in the laboratory until 11 a. m., Oct. 30th, when it consisted of coaglum above and whey beneath. Smears of this were made and stained for microscopic examination and sub-cultures made on serum, as the incubation of the milk had appeared a suitable way of increasing the bacilli of diphtheria were they present. The sub-cultures were also incubated. No diphtheria bacilli were found, but staphylococci and short, thick bacilli were present.

*"*B. Owatonnæ*" is the name used in this laboratory simply for the purpose of distinguishing that atypical form of *B. diphtheriæ* which has usually hitherto been observed only in specimens from this school.

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(*k*) Milk from can in kitchen of General Hospital building collected and examined at same time and in same way as above. No diphtheria bacilli found.

(*l*) Thirty c. c. water from cold tap to bath tub in Quarantine Hospital taken at noon, kept cool until 8:30 p. m., when it was added to about fifty c. c. of sterile broth, containing glucose (1 per cent) and glycerine (5 per cent), and incubated until 11 a. m., Oct. 30th, in order to allow *B. diphtheriae*, if present, to develop. Immediate cover-slip specimens, and those made later from incubated sub-cultures on serum, failed to show anything resembling *B. diphtheriae*.

(*m*) Water from cold water tap over kitchen sink in General Hospital taken at same time and tested identically as in (*l*) failed to show anything resembling *B. diphtheriae*.

(*n*) Earth four inches from surface at site shown on map collected in a sterile-plugged wide-mouth bottle by means of sterilized (boiled) spoon, kept cool from noon till 8:30 p. m. same day, when about twenty c. c. sterile broth (same as above *l*, *m*) was added, incubated until Oct. 30th, when sub-cultures were made on serum and incubated. Examinations of first and sub-cultures by means of stained specimens did not show bacteria resembling *B. diphtheriae*.

(*o*) Earth one foot from surface from same site was collected and examined as above, with negative results.

(*p*) Earth (yellow clay) three feet from surface from same site was collected and examined as above, with negative results.

(*q*) Earth (yellow clay) four feet eight inches from surface at same site was collected and examined as above. Numerous small bacilli. Two bacilli observed with polar granules markedly resembling *B. diphtheriae*, and a number of slender, slightly-curved forms, somewhat resembling *B. diphtheriae*. Subsequent examinations of this and sub-cultures on serum, however, failed to show them, which should not have been the case if serum can be considered a selective medium.

Eight agar and gelatine plates were made from the water and milk mentioned above, and the colonies per c. c. estimated, but the records have become mislaid.

In all of the examinations of specimens *a* to *j*, immediate inoculation was made upon serum, and subsequent generations of sub-cultures made at short intervals, in order to give *B. diphtheriae*, if present, a chance to develop on the serum, which is usually selective. Loffler's methylene blue was used for staining.

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A report of the state of affairs found and the results of the above examinations were made to the executive committee of this board, together with the following recommendations, already outlined as a possibility to Superintendent Merrill and Doctor Adair, who were present by appointment at the executive committee meeting: That owing to the very general infection in the school and the possibility of infection of a once germ-free throat whilst awaiting the result of examination, it seemed apparent that throat to throat infection alone could be responsible for the conditions existing, more especially as the results of the examinations of water, milk and earth, all of which had less opportunity of infection than the toys, etc., were negative.

Having, then, this great possibility—in fact, almost certainty—of sending out infected children to freshly sterilized cottages, even after two negative reports had been received, it seemed necessary to eliminate such opportunity of general infection before ascribing to the water, food, earth, etc., a place as infective agents. It will be seen, under the circumstances, that two or even ten successive negative bacteriological reports on a child's throat would not show that by the time of the receipt of the last report he was still uninfected.

It was then suggested that in one of the buildings a large number of small rooms be constructed, so as to secure absolute individual isolation, and that the whole school be gradually passed through this filter, as it were, and that the germ-free filtrate be kept absolutely separated in every way from those who had not yet been through the filter and be housed in a freshly sterilized building; that as soon as the clean filtrate became sufficiently large to warrant it, the others or infected children be confined and isolated.

The superintendent had already discontinued receiving children from outside. It was suggested that the children most likely to be free of bacilli, and those for whom there were outside homes awaiting, be first passed through the filter.

Superintendent Merrill and Dr. Adair were not only fully alive to the danger of a general clinical epidemic, of which the continued universal infection of the throats of the children by *B. diphtheriae* afforded opportunity, and of which the occasional occurence of mild or severe cases showed the possibility, but were naturally most anxious for its removal.

They could necessarily appreciate the great amount of inconvenience, extra work and expense which such seemingly heroic methods would mean to them much better than the members of the

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executive committee, but agreed to call a meeting of their board and report back to this board immediately.

The difficulty arising out of delay in reporting upon examinations was pointed out, and the executive committee was asked whether a bacteriologist could not be furnished. It was finally suggested that it might be possible for Dr. McDaniel to go.

The State Public School board, after meeting and receiving the report of Mr. Merrill and Dr. Adair of the opinion of the executive committee, agreed to adopt all the suggestions, and desired to establish a branch laboratory at the school, with Dr. McDaniel in charge. Acordingly, Dr. McDaniel went to Owatonna on Nov. 22d, taking with her those things necessary for the work which had not been sent before or which were not on hand at the school. The director of the laboratory went down on the morning of Nov. 25th, and remained until the evening of the 26th.

The authorities at Owatonna had already taken all possible pains in following out and adapting suggestions to the local conditions. Their efforts throughout are deserving of the highest praise. That building known as the "General Hospital" (see plans, etc., which will be on exhibition at the meeting) had been subdivided into fifty-three compartments, made of matched boarding, about seven and one-half feet high, and averaging about seven feet square, each with its separate door opening upon a hall. Over the tops of the compartments was stretched wire gauze, which, while not interfering with ventilation (the ceilings of the original rooms are about eleven or twelve feet high), prevented the exchange of germs between the occupants of the compartments.

Upon the outside wall of each compartment, near the door, were placed wooden boxes to contain an overall slip for the nurse to put on whilst in that compartment, a spraying apparatus, solution bottles, etc. A covered slop jar, soap, basin, drinking cup, nightgown, towel, straw bedtick and bedding were provided for each room. The bedtick lay on the floor, so that when change was necessary the straw could be burned and the tick, bedding, etc., put directly into a disinfectant.

The laboratory, Dr. McDaniel's and attendants' quarters were all arranged in the same building, so that there would be no necessity for any one leaving the building to mix with others. A room was arranged for disinfecting, so that a large metal receiver could have live steam run directly into it.

A description of the laboratory, which had been well provided with sink, shelf, drawer accommodation, a chicken incubator, etc., would be interesting, but perhaps unimportant, except that the

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absence of gas and full equipment render Dr. McDaniel's work more difficult.

In this laboratory all diagnoses are made, tubes are washed, cleaned and sterilized, and swabs made. The serum and other media are sent as required from the laboratory of this board.

For a description of the working of the plan, an abstract of Dr. McDaniel's latest report is here given:

"I have endeavored to make an exact statement of the work done up to Jan. 1, 1899. I hope it will be satisfactory. As to records of long and short isolation periods, I did not know just what to send, but have enclosed original records from six representative cases,—three long period and three short period cases.* In general there is noticed a day to day diminution in the number of bacilli present under daily treatment. In some cases it is apparent that the bacilli become more and more degenerate, even quite unrecognizable, and with a cessation of treatment the gradual approach to the typical forms can be observed.

"We are almost at the midway point, and very soon the other cottages, main building and school house will have to be disinfected. I hope you will be able to come down before that time.

"Very truly,
"ORIANA McDANIEL."

REPORT OF EXAMINATIONS MADE IN THE BRANCH LABORATORY, BEGINNING NOV. 29, 1898.

Number of children examined (to Jan. 1, 1899)		118
Number of children filtered through		60
Number of examinations made in state public school children	1,479	
Number of examinations made in Owatonna town schools	73	
Number of examinations made in Waseca town schools	104	
Number of examinations made in attendants and others	33	
Total number of examinations (to Jan. 1, 1899)	1,689	

STATE PUBLIC SCHOOL EXAMINATIONS.

Number showing *B. diphtheriæ* alone	16
Number showing "*B. Owatonnæ*" alone	24
Number showing *B. diphtheriæ* and "*B. Owatonnæ*" alternating	47
Number showing *B. diphtheriæ* and "*B. Owatonnæ*" together (all three showed in but one examination each; at all other times "*B. Owatonnæ*")	3
Total number showing either *B. diphtheriæ* or "*B. Owatonnæ*"	90

*These cards will be on exhibition at the meeting.

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OWATONNA TOWN SCHOOL EXAMINATIONS.

	In Nose.	In Throat.	Total.
Number showing *B. diphtheriæ* alone	1	1	2
Number showing "*B. Owatonnæ*" alone	23	21	44
Number showing both *B. diphtheriæ* and "*B. Owatonnæ*"	1	..	1
Number showing neither *B. diphtheriæ* nor "*B. Owatonnæ*"	9	13	22
Number questionable	..	1	1
Number showing scant growth	..	2	2
Number showing no growth	1	..	1
Total number of examinations	35	38	73

WASECA TOWN SCHOOL EXAMINATIONS.

	In Nose.	In Throat.	Total.
Number showing *B. diphtheriæ* alone	5	2	7
Number showing "*B. Owatonnæ*" alone	19	10	22
Number showing neither *B. diphtheriæ* nor "*B. Owatonnæ*"	27	33	60
Number questionable	..	6	6
Number showing scant growth	..	1	1
Number showing no growth	1	..	1
Total number of examinations	52	52	104

The hospital building, which is used for isolation, was sterilized in the following manner: The atmosphere was thoroughly saturated with "dry" steam, after first sealing all cracks, etc. Sulphur, 1 pound to 216 cubic feet, was burned, the building closed and left closed twenty-four hours. The walls, ceilings, floors and furnishings were then scrubbed with corrosive sublimate solution (1-2,000).

The receiving cottages have been fumigated in the same way, except that in "C I"; sterilized Dec. 21; a larger amount of sulphur was used.

For the isolation work, six rooms of the hospital have been divided into fifty-three compartments (about 5x7). Each compartment is furnished with a chair, a straw bed and bedding, nightgown, towel, covered slop jar, soap, basin, and drinking cup. Toys, magazines, papers, etc., are supplied as desired. Nailed to the outside of each compartment is a box containing an atomizer with solution bottles; also an all-over slip for the attendants.

Each child is put in his compartment and not taken out till six negative examinations—three from nose and three from throat—are obtained. After from two to four negatives, the child receives an antiseptic bath and a sterilized suit of clothing. The

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walls and floors of the compartment, together with the chair, are scrubbed with corrosive sublimate solution, the bedding is changed, and slop jar, basin, cup, etc., are boiled. All toys and papers are burned or boiled. All spraying, gargling, etc., is stopped at least twenty-four hours before the taking of the last two cultures.

When the required six negative examinations have been obtained the child is again given an antiseptic bath, dressed in sterile clothing and sent to one of the receiving cottages. Here he is held in quarantine, and not even allowed to skate on the pond with the unclean.

Before another child occupies the compartment its walls are whitewashed, the floor and chair are scrubbed with corrosive sublimate solution, the bed, bedding, etc., are changed, and other furnishings boiled.

The following cases I have noted as especially interesting:

(*a*) Anthony Smuhl. When entered complained of "sore throat." While his nose culture showed nearly a pure culture of "*B. Owatonnae*," his throat culture showed but staphylococci and few "slightly suspicious" bacilli. On the second day (throat still inflamed) throat showed staphylococci; nose showed "*B. Owatonnae*" in abundance. As the inflammation subsided "*B. Owatonnae*" was found in both nose and throat.

(*b*) Maud Wright. During a mild acute follicular tonsillitis, with considerable exudate. No *B. diphtheriae*, typical or atypical, were found in cultures from throat, while cultures from nose showed "*B. Owatonnae*" to be constantly present. Several days previous to onset of the tonsillitis, and again after the subsidence of the inflammation, "*B. Owatonnae*" was found in throat as well as in nose.

(*c*) James Arthur. With suppurative otitis media; and in whom diphtheria bacilli are found constantly present in throat and nose. Pus from external auditory canal shows diphtheria bacilli in abundance.

One "new arrival" from Rochester, Minn. Nose showed *B. diphtheriae*, unevenly stained; throat showed *B. diphtheriae*,—a few involution forms. Other "new arrivals"—one from each of following places: Faribault Institution for Feeble Minded, Princeton, Morristown, and Philadelphia, Pa.—showed no *B. diphtheriae* in either nose or throat.

ORIANA McDANIEL.

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The occurrence of typical *B. diphtheriae* and its variant or atypical form, "*B. Owatonnae*," in such a large percentage of the children's throats in the State Public School, led to the question of whether other institutions, city schools, etc., were in a similar condition.

Dr. Adair therefore, as will be seen by Dr. McDaniel's report, secured specimens from the city schools of Owatonna and Waseca, with the surprising results of examinations noted.

It is the intention of the laboratory to endeavor to secure systematic examinations of the throats of children both in the country towns and in the cities, and the sanction and collaboration of the board is here asked for.

On the results of such examinations, it may not be advisable to institute any quarantine or other restrictive measures, but to try and find out something of the personal and clinical history of the children whose throats are found to be infected. Systematic examinations of the inmates of other state institutions is also desirable. The exact position of the atypical form "*B. Owatonnae*," relative to clinical diphtheria and to the typical forms, it is desired to establish.

In over 6,000 examinations of throats for diphtheria (mostly of children) made in this laboratory, this form had been met with only at the State Public School of Owatonna, with but few (probably under twenty-five) exceptions, until they were found in the city schools of Owatonna and Waseca.

In "A preliminary report on *B. diphtheriae* and its variants in a school in which diphtheria is endemic," the reasons for considering this ("*B. Owatonnae*") an aberrant form of *B. diphtheriae* were given.

It occurs alone, mixed or alternating with typical forms in cases of sore throat and in children whose throats are apparently normal. It can therefore, apparently, produce sore throat or not, just as the typical bacillus can. It has about the same degree of virulence for guinea pigs as the morphologically typical forms. Its arrangement in groups is characteristic.

Some interesting information bearing on the question of the widespread distribution of *B. diphtheriae* was recently obtained in a conversation with Dr. J. P. Barber, of Minneapolis, who, in collaboration with Dr. Frank Corbett, bacteriologist to the city of Minneapolis Health Department, examined the throats of one hundred and seventy-five children in one of the city schools where some cases of diphtheria had occurred. Only those rooms in which the affected children had been were examined. Of the one hundred and seventy-five children, one hun-

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dred and sixty were examined only once, twelve twice and three three times. One hundred and seventy of the throats showed no diphtheria bacilli, and five yielded cultures containing *B. diphtheriae.* Of these five children, one had been released from quarantine on a negative report from a specimen taken from the tonsil; one had a history of sore throat; one later had diphtheria; and two had neither before nor after any symptoms of throat trouble.*

The situation of the State Public School in Owatonna and the necessary mixing of attendants, etc., with the population of the town, would render an infection of the throats of the children in the town schools not impossible. There have, however, been cases of diphtheria occurring at intervals for a long time in the town.

The condition at Waseca is perhaps not easy of explanation. Efforts will be made to find out whether any diphtheria has occurred there, or if any probable opportunity of direct transfer of the bacilli from the State Public School has been afforded.

The opportunity of testing various methods of treatment in ridding the throats of *B. diphtheriae* under the arrangement of Owatonna is ideal, since, if any method should prove efficacious, it can be determined, because no opportunity of reinfecting the throat is afforded between the time of making the bacteriological tests. Results obtained, therefore, may be considered to be probably due to treatment. The whole undertaking is unique, and the results obtained will be a very valuable addition to what is known of diphtheria and its diagnosis and treatment, as well as of the methods of infection and the best means of protection against and limitation of the spread of infection. It is the intention to go through and test again the children who have been found clean and assigned to sterilized cottages. That they have been found clean for six successive examinations (three from nose and three from throat), should demonstrate the absence of *B. diphtheriae.* The reëxaminations will be made with great trepidation.

As will be seen from Dr. McDaniel's table, sixty of the one hundred and thirteen children who have come into the filter have been sent out to sterilized cottages or assigned to homes for adoption throughout the state.

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*Dr. Barber reported verbally also a case of suppurating ear disease occurring in a child who had been discharged from hospital where it had been sent on account of diphtheria. This case was dismissed from the hospital on a negative bacteriological examination of a smear from the tonsil. Dr. Barber took swabs from the posterior nares and the exudation from the ear, both of which, upon cultural examination, showed *B. diphtheriæ.*

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Of the one hundred and thirteen examined, ninety were found to be infected with *B. diphtheriae* (typical or atypical forms); therefore twenty-three required no treatment, and were isolated only long enough to see that they could safely be passed on.

Notes are made of the condition of all throats, as it is thought that where there is chronic inflammation or hypertrophy the bacilli persist longer.

The shutting up of the children would appear to be a very great hardship, but, on the contrary, they fare very happy; and that the quietude and rest obtained have proven beneficial is shown by their improvement in general condition. In fact they have become fat. No discontnent is felt by the children, and the work has on this account lost a great deal of its terrors, although the closing of the day schools and strict isolation of such a large part of the population and general interference with routine life is keenly felt.

The efforts of the school management and staff are worthy of all praise and deserving of success, whilst the voluntary exile of Dr. McDaniel and the heroic work of Dr. Adair will be in a measure repaid by the very great opportunities for the acquirement of valuable scientific information afforded.

This work cannot but reflect credit upon this board and state, and it is indeed a fortunate thing that such amicable coöperation of two of the state boards is possible.

TYPHOID FEVER IN THE FIFTEENTH REGIMENT, MINN., U. S. V.

A preliminary report on the work of the laboratory in relation to the outbreak of typhoid fever in the 15th Regiment, Minn., U. S. V., was made to this board at its last quarterly meeting, and it was hoped that by the present meeting full data would be at hand for a complete report. That such is not the case is due almost wholly to the fact that the physicians in charge of the patients, after they were sent to the hospitals, although earnestly and frequently appealed to, have failed to furnish essential data, which is in their possession alone. Surgeon Major Dennis' report shows a total of 406 cases of typhoid in the regiment, 346 of which occurred before the departure for Camp Meade. The laboratory examined specimens from but 342 men, not all of whom had typhoid. Of the 342 patients from whom specimens were examined, clinical data has been returned by the attending physicians on but 58. No map or plan has yet been obtained of the State Fair grounds.

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Of the 342 patients from whom specimens were obtained positive "Widal reactions" were found, one or more times, in 241 cases; negative reactions only were present in 87 cases; and in 14 cases only partial or doubtful reactions were obtained.

Of the 241 cases, which at some time gave a positive reaction, only 107 were examined on or before the seventh day. Of these 62 gave positive reactions on days of the disease, as follows:

One on the first day of the disease.

Seven on the third day of the disease.

Ten on the fourth day of the disease.

Eight on the fifth day of the disease.

Ten on the sixth day of the disease.

Twenty-six on the seventh day of the disease.

Of the remaining 45 cases 41 were examined only once with negative results before the seventh day, and were not again examined until too late in the disease to make the positive results then obtained of any value in determining the data of the appearance in the blood of the agglutinating substance.

The four remaining cases are of special interest, and the record of their examination is given in full.

CASE A		CASE B		CASE C		CASE D	
Day of Disease.	Reaction.	Day of Disease.	Reaction.	Day of Disease.	Reaction.	Day of Disease.	Reaction.
7	Absent.	5	Absent.	7	Absent.	5	Absent.
10	Absent.	10	Absent.	10	Absent.	10	Absent.
11	Absent.	11	Absent.	11	Absent.	11	Absent.
12	Faint.	16	Absent.	16	Absent.	16	Absent.
16	Absent.	17	Present.	17	Present.	17	Present.
17	Present.	18	Present.	18	Absent.	18	Present.
18	Absent.	19	Absent.	19	Present.	19	Faint.
19	Faint.	21	Present.	30	Present.	21	Present.
21	Present.	24	Present.			24	Present.
24	Present.	26	Present.			26	Present.
26	Present.						

These were apparently all cases of ordinary typhoid fever, neither very mild nor very severe. The disappearance or lightening of the reaction about the latter part of the third week in certain cases in which its first appearance had been delayed has been noted in other cases reported from the laboratory (see Philadelphia Medical Journal, March 26, 1898).

Of the fifty-eight cases on which clinical data has been received fifty-six were diagnosed clinically typhoid fever. All these gave

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the Widal reaction one or more times. One was clinically diagnosed as "convalescent" from typhoid and gave no reaction.

The urine in forty-nine of the fifty-eight cases showed the diazo reaction, in five it was noted as "absent" and in two "not tested."

The overworked condition of the staffs of the various hospitals made it impossible for them to collect urine or other excreta with aseptic precautions for bacteriological investigation.

The workers in the laboratory were altogether too few to study to the best advantage the material most readily collected, and by reason of the sickness of the executive officer of the board in addition to the ordinary duties they were called upon to visit the camps and make suggestions as to isolation, disinfection, etc. Consequently the contemplated examination of various excreta from the patients was not undertaken.

The bacillus isolated from the bodies of flies caught at the mess tent of Company H, so far as morphological and cultural appearances go, is not to be distinguished from known typhoid bacilli. But it does not react to known typhoid blood even of most intense reactionary power, and it is so feebly pathogenic to guinea pigs as to leave doubts of the animals having died from the inoculation at all, more especially since the organism has not been recovered at autopsy. The source of this organism, either within or upon the bodies of flies, is such an unknown factor as influencing its biological characteristics that the problem is still unsolved. Efforts are still being made by the use of various culture media, etc., to increase the virulence of the germ, and if possible also to restore—on the assumption that it has been lost—its reactionary power to typhoid blood. Such a problem must necessarily be slow of solution, but is well worth the labor which has been and must still be expended on it.

It must be remembered, however, that a negative result in this and in other examinations of materials from the camp does not exclude a sink-to-soldier infection. The origin of the first cases will probably never be accurately determined, though facts stated in the laboratory report at the last quarterly meeting of this board would seem to indicate the probable source to have been individual infection in the city of Minneapolis. But the ocular evidence of the probability of infection from the sinks after their contamination was so strong at the times when they were inspected by bacteriologists from the laboratory that the wonder was how any who used them for purposes of defecation could escape infection. Fæces and urine were deposited by the men themselves on many objects with which afterwards the hands or the clothing of other men came in

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contact. Flies were abundant and must have distributed fæcal material and bacteria over all the rails, etc., of the sinks (probably also to food, etc., at the mess tents). A policy that would have kept the places free from danger would have covered or disinfected immediately after excretion all fæces and urine. This was practically impossible with the men unused as they were to discipline. An effort was made to do so at the sinks, but it was so imperfectly carried out as to leave innumerable opportunities for infection.

F. F. WESBROOK, M. D.,
Director.

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REPORT

OF THE

VETERINARY DEPARTMENT

FOR THE

QUARTER ENDING DEC. 31, 1898.

GLANDERS-FARCY.

There was a very satisfactory improvement in the glanders-farcy situation during 1898. This may not be apparent at the first glance, but a careful analysis of the following facts and figures will support this statement:

During 1897 glanders-farcy was found in twenty-seven counties; in 1898, in thirty counties. During 1897, 391 horses were tested with mallein; during 1898, 381. There were killed during 1897, 180 horses, and during 1898, 165. During the last quarter of 1898 forty-four horses were killed.

A year ago I called the attention of the board to the fact that the disease had been especially prevalent in the western and northwestern counties. The records show that the same condition has been maintained in 1898. The counties in which we have found five or more cases of glanders-farcy, and the number killed in each county, are as follows. Hennepin 32, Yellow Medicine 18, Polk 16, Traverse 12, Marshall 9, Otter Tail 7, Rock 6, Wadena 5, Murray 5. Cases of this disease have been located in twenty-one other counties, as follows: Chippewa, Lyon, Stearns, Hubbard, Clay, Wilkin, Swift, Renville, Jackson, Faribault, Carver, Rice, Goodhue, Wabasha, Mower, Freeborn, Morrison, Aitkin, Ramsey, Anoka and Todd.

I am pleased to call your attention to the marked improvement in what was designated last year as the badly infected counties:

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	1897.	1898.
Polk	32	16
Carver	30	2
Chippewa	22	4
McLeod	11	None.
Winona	8	None.
Kandiyohi	8	None.
Redwood	6	None.
Faribault	7	2

These figures will show plainly to those familiar with the peculiarities of this disease that the work was well done in these counties in 1897. The fact that the disease was found in three counties more in 1898 than in 1897 does not indicate an increased spread of the disease, but only shows that new centers have been discovered.

It should be explained concerning the large number given for Hennepin county, that this does not mean that Minneapolis horses are worse infected with glanders-farcy than horses of other large cities, but that in Minneapolis such cases have been found and destroyed.

After nearly one year's experience with its working I am satisfied that our change in our method of dealing with glanders-farcy was a wise one. The rules which have been in force since last spring have stood well the test of actual field work. I refer especially to the rules prescribing what horses shall be destroyed without delay, and giving option to local health officers concerning other horses that have reacted on mallein test.

The circular of rules and suggestions concerning glanders-farcy, which was also adopted by the board last spring, has been of great assistance both to this department and the local health officers. I have no other suggestions in mind or changes to propose for this portion of the work at present. I wish very earnestly that the work with tuberculosis and hog cholera was in as satisfactory a condition. We have had no trouble with owners or local health officers during the past year, and no appraisals to pay.

Some of the more important cases which we have had to deal with during the quarter are as follows: On October 20th Dr. Brimhall went to Blue Earth City, to dispose of an outbreak of glanders-farcy in that vicinity. The local health officers had not been able to handle this outbreak successfully, because of certain complications. The horses had been tested and condemned while in Blue

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Earth City, but had been removed to the country before they were quarantined. This was quite easily disposed of by Dr. Brimhall.

Another outbreak of glanders-farcy, at Staples, was complicated somewhat by the fact that the horses had been tested by a non-registered man, and the owner objected to having the horses killed. This also was easily disposed of, three glandered horses being killed on November 29th.

In Oak Grove township, Marshall county, six horses were killed, after formal protest by the owner, according to section 5 of the law. All were pronounced glandered by Drs. Brimhall and Davidson, who conducted the post mortem. It was agreed that the decision of these two should be considered final, and the third expert was not employed. In order to make thorough work, the town board bought one colt which had not reacted and killed this one also.

An interesting case of glanders-farcy was taken care of at Wadena. In this case six horses were tested; five reacted and were destroyed. The disease had been diagnosed as influenza by a local veterinarian, and this, of course, complicated matters greatly, causing considerable correspondence and some local disturbance.

HOG CHOLERA.

I take pleasure in reporting that the hog cholera situation for the past quarter, and for the entire year, shows a decided improvement over 1897. The improvement is more important than indicated by the following figures, for the reason that there has been little hog cholera in the south central and southeastern counties. These counties were generally infected during 1897, and it should be remembered that these are the counties in which a large proportion of all the hogs of the state are raised and fed. The comparison between 1897 and 1898 is as follows:

1897—Two hundred and fifty-four townships in forty-one counties.

1898—For the year, ninety-three townships in thirty-two counties. During the last quarter, ending December 31st, twenty townships in fourteen counties.

I am unable to give you positive data as to losses during the three years of 1896, 1897 and 1898, but it was carefully estimated from a large number of reports that the loss in 1896 amounted to about $1,000,000. In order to get an accurate estimate for 1897 I sent out a circular letter to township supervisors asking for estimates by the single township. The reports which came in response to this circular showed that the state lost, during 1897, $487,500.

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It has been carefully estimated that the loss for 1898 is about two-thirds that of 1897, or, in round numbers, $325,000, a very material reduction.

I have reason to believe that the hog cholera regulations adopted at our July meeting have been much more satisfactory and practical than the old rules in force last year. The circular of information for local health officers has been of great assistance to those officers, and has lessened our office correspondence.

Our method of dealing with the hog cholera problem in connection with the state fair was eminently successful this year, although it seemed unfortunate at the time that the circulars concerning swine exhibits at the state fair were not distributed earlier. A letter was addressed to each of the exhibitors, for the purpose of learning whether hog cholera appeared in their herds after reaching home, or in fact, at any time after leaving the Minnesota state fair, and the reply in every instance was to the effect that no such unfortunate result had ocurred. The exhibitors seemed well pleased with the precaution which we had taken to protect the stock interests of the state.

The circular concerning hog cholera cures has probably saved considerable money for the farmers of Minnesota.

I am convinced that Dr. Annand's work in connection with hog cholera has resulted in a great saving for the stock interests of Minnesota. This is indicated by the fact that the disease appeared in but nine townships situated in or north of the line along which he worked across the state last summer. In one of these townships four places were promptly quarantined, and there was no further spread. In another township three farms were affected. All were quarantined, and I have heard nothing further from the outbreak —evidently in satisfactory condition. More or less serious outbreaks occurred inthe remaining seven of these townships. I have reason to believe that in all of them the work of the local health officer was prompt and intelligent.

Officers of the county and district fairs throughout the southern part of the state deserve commendation for their hearty coöperation. A letter was addressed to the secretary of each association in the infected portion of the state, urging that no swine exhibits be held in connection with their local fairs, and the officers usually adopted this suggestion.

During the past quarter I have had quite a number of requests for permission to sell hogs out of quarantined yards. After some investigation, it became evident that there was not sufficient reason

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why those requests should not be granted in some cases. It has therefore been my custom to authorize such sale, when the hogs had remained healthy for a considerable period, and were in condition for market. Certain conditions have been imposed, viz., such hogs must be sold only for the purpose of slaughter, and must go direct to stock yards. Furthermore, the local health officers must personally investigate the situation, and recommend that this permission be given.

We have had some encouragement from owners and local health officers during the year, of which the following is a sample: The chairman of Custer township, Lyon county, wrote, among other things: "Please send me some of those individual notice cards and blanks. I write this believing that if this had been done (that is, quarantine ordered) two years ago, the town of Custer would have been saved thousands of dollars."

TUBERCULOSIS.

The problem of dealing with bovine tuberculosis is still a partially unsolved one. Our present methods are far from ideal, and yet I have nothing better to suggest at present, except some alterations in the law. It seems quite evident now, and it will probably be true for some time to come, that the most that we can do will be to inform the public as rapidly and thoroughly as possible concerning the disease, encourage owners and breeders to have their cattle tested by furnishing tuberculin free through their local health officers, permit sale for food purposes when carcasses have passed inspection, and insist that when there is any reasonable evidence of existing tuberculosis in a herd the entire herd shall be tested and the diseased animals dealt with according to our recognized rules.

The blank, "Order of Quarantine," which we have been using since last April, has been of considerable assistance in this difficult work. The rules which were adopted by this board on April 12th are probably as rigid and widely inclusive as practical. One of the difficult points in this problem is the management of cattle during the period of quarantine, which the law prescribes in paragraph 2 of section 4. It is very difficult indeed to get dairymen and farmers to maintain quarantine that is worthy the name. It has also proven difficult to control the conditions of slaughter. It is to be hoped that we may soon secure some revision of the present law dealing with infectious diseases of animals. This will be absolutely necessary before we can improve some of these conditions.

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Acting upon the suggestion from our secretary, I have been trying to get in close touch with, and make my department as helpful as possible to, the various state institutions. With this end in view, I have written the following letter to the superintendent or officers in charge:

Dear Sir: I wish to make the veterinary department of the state board of health as helpful as possible to the various state institutions. I feel that the dairy herds furnishing milk for all state institutions ought to be tested regularly with tuberculin. If we can do this work during the fall, winter and spring seasons, and select our own time for doing it, we will be able to furnish the veterinarian and tuberculin free of expense to the state institutions whose officials wish to have their dairy herds tested. The only expense to the state institutions would be for the incidental expenses of our field veterinarian, Dr. S. D. Brimhall, his salary, transportation and the tuberculin being furnished by the state board of health.

I would be pleased to hear from you concerning this matter, and to render any assistance that I can.

Very respectfully,

This letter was written to the following institutions: The school for the deaf, Faribault; Fergus Falls hospital for the insane; Rochester state hospital; St. Peter state hospital; school for the blind, Faribault; school for the feeble-minded, Faribault; state public school, Owatonna; Minnesota training school, Red Wing; state prison, Stillwater; soldiers' home, Minnehaha Falls; state reformatory, St. Cloud.

I have received replies from all of these institutions except four, only two of them, however (the Minnesota soldiers' home and the Minnesota school for the deaf), accepted the offer and were actually ready for the work to be done. The cattle at these institutions were tested with the following results: At the former institution six were tested with no reactions, the herd being probably free from tuberculosis. At the latter institution six cattle were tested—one tuberculosis, and one suspicious. On December 28th I wrote the superintendent of this institution, giving suggestions as to the disposition of the tuberculous and suspicious animals. My letter was kindly received, and the superintendent has decided to follow the suggestions.

The letters from the superintendents were all favorable to the proposition, in a general way, and all of them expressed their appreciation of the offer. Some of them were going to bring it to the attention of their boards at coming meetings, and stated that they did not feel like authorizing the expense (which, by the way, would have been very trifling) without bringing the matter to the atten-

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tion of their respective boards. At the St. Peter state hospital they have been testing their own cattle at regular intervals for over a year, and I have every reason to believe that the work has been well done. I have heard nothing further from any of these institutions.

It would seem that such a matter as possible tuberculosis among dairy cattle furnishing milk for inmates of these institutions should be carefully considered, and the work done as promptly as possible. This work could be done by Dr. Brimhall with very little expense to either this board or to the institutions which would be benefited by it.

OUR NEW LAW.

Minnesota has earned the reputation among veterinarians of the United States as having one of the most practical and successful laws dealing with infectious diseases of animals in this country; but there are some points in this law which might be improved. For instance, the second paragraph of section 4, which gives owners the privilege of demanding a second test with tuberculin, and which offers a quarantine period of not less than two nor longer than three months, has always been a cause of trouble. During this delay there is constant temptation for owners to dispose of their cattle. Effective quarantine can be maintained only with the greatest difficulty for so long a period. Cattle are liable to react on first test and fail to react on retest, and yet be tuberculosis all the time. It compels the state board to keep a lot of quarantined stock under observation and partial control for a long period of time, and greatly increases the work without any corresponding advantages. Summing up the objections to this paragraph as it now stands, I think it can be fairly stated that it has constantly tended toward imperfect and unsatisfactory work. It may well be questioned whether it is wise to do away with this paragraph; but either this should be done or it should be materially modified. My present thought is, that the second test should be done away with, and that owners should be given the option of feeding for a period of perhaps one month, providing they care to take the risk of feeding cattle whose carcasses may be condemned after slaughter.

The privilege of protest and appraisal, as given in paragraph 5, is undoubtedly fair and wise in case of glanders, but the wording of section 4 should be such as to preclude this privilege in case of tuberculosis, inasmuch as owners are entitled to sell carcasses that pass inspection, and carcasses that cannot pass inspection could

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not be considered as having any commercial value in any case. The owner is thus protected without giving the possibility of trouble from a constant series of protests and appraisals, which owners, especially city dairymen, would be quite certain to make.

Section 5 does not provide any compensation for the veterinarians conducting the post mortem after protest, nor for the appraisers. It has been understood in the past that the owner should pay the veterinarian and appraiser selected by himself, and the local board should pay parties it selects; but no provision is made for paying the third veterinarian and appraiser, and the law does not specify clearly as to who shall pay for the first two. Furthermore, the state board must pay four-fifths of all appraisals, and should always be represented at the post mortem and on the board of appraisal. This paragraph should be so worded as to state clearly how these parties shall be selected and paid.

Chapter 47, "An act relating to the spread of disease among swine," needs some revision; for instance, a certain portion of this section should be modified so as to read somewhat as follows: "No person shall sell, or give away, or offer for sale, any swine that have died of any disease, or are affected with any disease."

BLACK LEG.

Black leg has been much less prevalent in 1898. But three reports during the entire year, and none during the past quarter.

MICELLANEOUS DISEASES.

Quite a number of apparently new diseases among domestic animals have been investigated during the year. Among the more important ones are the following:

On December 14th Dr. Brimhall went to Mankato to investigate a serious skin disease that was affecting a flock of 5,200 sheep, about ten per cent being diseased. The conditions and symptoms were such that it seemed very probable that the trouble was due to scab, but upon investigation Dr. Brimhall has proven quite conclusively that the trouble was due entirely to the seeds of two species of wild grass, probably squirrel tail or wild barley (*Hordeum jubatum*) and wild oats (*Stipaspartea*). The sheep had evidently been pastured where these grasses were abundant. The former causes a great deal of trouble in the mouths of horses, but so far as I know has never been reported as causing trouble of this kind among sheep. The wild oats grass has a peculiar seed, one end

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being sharp, with a peculiar barbed arrangement consisting of stiff hairs on the chaff. These permit the point to puncture the skin but forbid natural removal. At the other end is a long spiral tail, technically the awn. Alternate drying and wetting and changes of temperature cause the awn to twist and untwist so as to produce a boring motion at the barbed head. This outbreak was especially interesting, on account of the fact that the sheep had recently been dipped, and this supposed scab had appeared soon after dipping. The owner and neighbors were greatly relieved after the nature of this disorder had been demonstrated.

On October 1st Dr. Brimhall investigated another trouble among sheep, which proved to be due to two parasites, the stomach worms (*Strongylus contortus*) and tape worms (*Taenia expansa*). These sheep had been unthrifty for some time. The owner was given advice as to treatment and change of pasture.

At another place Dr. Brimhall investigated an outbreak of hog cholera among a herd of pure bred Poland Chinas, and prevented a probable serious spread of this disease by prohibiting the removal of hogs which had already been sold. This outbreak was very unusual, from the fact that thirty hogs had been distinctly sick and but seven died.

On October 24th Dr. Brimhall tested a herd of fifty-six cattle at Eden Prairie township, Hennepin county, of which eight were killed, only two of them passing inspection. This appearance of the disease was practically a continuation of a former outbreak in Elk River, among cattle belonging to the same party. The cattle had been removed from the latter place to Eden Prairie township, when the owner became suspicious that they were infected with the disease and were liable to be tested at Elk River.

In the latter part of August Dr. Brimhall went to New Brighton, to see to the proper disposal of eight lumpy-jaw cattle. Four were condemned; three passed inspection; one was found, on close examination, to be an error in diagnosis.

In connection with Dr. Wilson, Dr. Brimhall has investigated several apparently new diseases among horses. One of these was a widespread influenza of peculiar type, which involved a number of horses, estimated at 200.

September 27th, at Belgrade, a strange disease had caused the death of five horses in a lot of twelve. Two were sick at the time of visit. These two recovered under treatment. No other cases appeared after the food was changed as suggested. A peculiar rust was found upon the grass in low-lying portions of the pasture.

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At North Branch, in a herd of nine cattle, five had died and two were sick at the time of visit. The trouble in this case was probably due to some poisonous plant in the pasture. The two sick animals recovered under suggested treatment. No more were taken sick after the change of pastures.

An interesting outbreak of cerebro-spinal meningitis occurred among cows near Rosemount. Five of them died in one week. I understand that the bacteriological laboratory has obtained the specific diplococcus, and that this practically identifies this disease with the human, equine, ovine and canine forms. This disease is apparently becoming widespread, and should be investigated.

FINANCIAL MATTERS.

Unless we can have an increased appropriation from the legislature it will be impossible to enlarge the work and do a great deal more that ought to be done for the stock interests of the state.

We need two more field veterinarians for a part of the year, perhaps eight months, to do work similar to that done by Dr. Annand during 1898. We ought to be in condition to go to the relief of local health officers more frequently. We need money to prosecute suits, and get better enforcement of law. Provision should be made for emergencies that are liable to arise, and we should not be in such financial condition that it is necessary to use up all available funds for routine work. We are liable to have a serious outbreak of sheep scab at any time, and ought to be prepared to deal with it vigorously.

Our field veterinarian should be supplied with abundant transportation and laboratory material for gathering specimens, and in general we should be in such condition that we can collaborate more effectually with the bacteriological laboratory and investigate new outbreaks thoroughly and promptly. A representative of the bacteriological laboratory should be abundantly supplied with transportation, so that writing for transportation will be unnecessary. We should also be in condition to provide and take care of a few larger animals devoted to experimental work. There is certainly a splendid field in this state for this sort of work.

It is very evident that there are several interesting and important diseases prevalent among live stock in this state that have never been recognized, and others, like epizootic abortion and malignant catarrh, that are very important and but little understood.

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It is to be earnestly hoped that the legislature will give us a satisfactory law that will enable us to deal with the problem of meat and slaughter-house inspection, and particularly that we may be able to obtain a system of public abattoirs in the larger cities. A satisfactory inspection of meats slaughtered at other than such abattoirs has never proven satisfactory.

It is probable that milk pasteurization can be cheaply done on a large scale. If this is true, then all the milk that is shipped into our cities should either be pasteurized or come with a certificate of tuberculin test of all cattle in the stables from which it is taken.

M. H. REYNOLDS, M. D., V. M.,
Director.

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CONRTOLLING THE USE OF MILK AND MEAT FROM TUBERCULOUS ANIMALS, AS A MEANS OF PREVENTING THE SPREAD OF TUBERCULOSIS.*

BY H. M. BRACKEN, M. D.

Professor of Materia-Medica and Therapeutics, Minnesota; Secretary and Executive Officer Minnesota State Board of Health.

The sale of milk from a tuberculous animal should be absolutely prohibited. It is a common idea that so long as the udder of a cow is not involved in the tuberculous process, the milk may be free from infection, but this is not safe reasoning, as demonstrated by various observers, and so ably set forth by Dr. Ravenal in a paper read at Philadelphia in 1897, before the American Public Health Association.

There is but one way to control the sale of milk from tuberculous cows, and that is through control of the dairy. The selling of milk should be permitted to those only who have a statement from the proper authorities setting forth the fact that their cow or cows are free from tuberculosis. The tuberculin test is the only reliable means of determining the presence or absence of tuberculosis in a given cow. All cows should therefore be subjected to the tuberculin test, and those that respond to this test should be rejected as milk-producers, and placed in quarantine. There are some cattle so thoroughly infected with tuberculosis that they fail to respond to the tuberculin test. Those animals can generally be condemned on the clinical symptoms, without resorting to the tuberculin test.

A single test of a cow or cows should not be considered sufficient. Cattle that are free from tuberculosis to-day may be affected at some later date. Milk-producers should be tested every six months, if possible, and at the farthest not more than one year should be allowed to pass without a retest. Dairymen should not be forced to bear the expense of these tuberculin tests. The tests are made chiefly for the good of the public, and therefore the expense should not fall upon the public, either through municipal or state authority. There should be no attempt to compensate a dairyman financially for the loss of a tuberculous milk-producer. Such a course would make it of little importance to the dairyman whether his dairy cattle were tuberculous or not. Let the dairyman understand that the financial loss associated with the existence of tuberculosis in his dairy herd rests upon himself, and he will quickly become one of our most important aids in eliminating this disease from his herd.

Boards of Health, state and municipal, should be looked upon as the friends of the dairyman in his attempt to eliminate tuberculosis from his herds. They should take particular pains to urge upon the dairyman the necessity of buying only such cows as have stood the tuberculin test. They should also point out the existing dangers in a stable that has formerly contained tuberculous animals, explaining the possibility of infection from such a source. They should also insist upon the fact that cattle poorly housed, poorly fed and poorly cared for are more liable to infection than are cattle

*Read at the Conference of State and Provincial Boards of Health, Aug. 10, 1898.

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receiving the reverse of such treatment. They should not only point out these facts, but should insist that all dairies must come up to a certain standard in cleanliness, air-space and ventilation, and that certain foods (commonly known as slops) should be excluded from use in a dairy. Dairy cattle should be as well housed, groomed and fed as the thoroughbred horses in our well-kept stables.

It may be said that the dairyman cannot fulfill all these demands and sell milk at the present price. Quite true. Let him raise the price. No one, not even the poor man, can reasonably object to paying a little higher price for milk, providing he can be assured that the higher-priced milk is safe as an article of diet, when the lower-priced milk is not safe as such. If necessary to protect the dairyman financially, Boards of Health establishing a standard for the dairies might reasonably be expected to fix the price for the milk produced at such dairies.

It has been stated that all cattle responding to the tuberculin test should be condemned as milk-producers. It does not follow that all cattle responding to the tuberculin test should be condemned as meat-producers. They should be kept under strict quarantine, however, and killed under careful inspection.

Cattle that have a very limited area of infection may respond to the tuberculin test. They at once become unsafe as milk-producers. At the same time they may be in good flesh, or a sufficient time may be granted the owner to fatten them, provided strict measures are taken to prevent the cattle from passing out of quarantine.

Such cattle should be slaughtered under inspection, and the carcass passed or condemned, according to the judgment of the inspector. We should go still further, and say that all animals intended for meat should be killed under inspection. Prudden, in his little book, "The Story of the Bacteria," says, on page 73: "It is almost inconceivable that any man not wholly given over to the spirit of the devil should be capable of sending into the market meat from the tuberculin cattle, if he is aware of it. Yet there is reason for believing that a very considerable amount of such diseased meat is actually sent into our large towns every week, with the full knowledge of some of the unscrupulous dealers, and probably consumed, usually by the poorer and more ignorant classes." We all know this statement to be a true one. There is but one way to prevent it, viz., by establishing a strict inspection, both ante and post mortem, as is that carried out under the Bureau of Animal Industry in the inspection of meats for export. The inspectors should be of as high a grade as are those under the Bureau of Animal Industry, and should be under the control of the state or municipal Board of Health.

In reviewing this subject, the following points are before us for consideration:

1. Milk should only be used from cows that have stood the tuberculin test.

2. Dairies and dairy cattle should be under constant inspection.

3. All cattle slaughtered should be subject to a thorough inspection, both ante and post-mortem.

4. This work should be under the control of Boards of Health.

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Because of the insertion of a leaf after the cross references had been filled in, the following references are changed:

Reference on page 35 to 181 should read 183.
Reference on page 39 to 279 should read 281.
Reference on page 126 to 190 should read 192.
Reference on page 127 to 193 should read 195.
Reference on page 139 to 56 should read 58-298.
Reference on page 145 to 331 should read 333.
Reference on page 145 to 301 should read 303.
Reference on page 152 to 319 should read 321.
Reference on page 166 to 313 should read 315.
Reference on page 176 to 175 should read 177.
Reference on page 192 to 184 should read 186.
References on page 199 to 183 should read 185.
References on page 200 to 183 should read 185.
References on page 201 to 183 should read 185.
References on page 202 to 183 should read 185.
Reference on page 214 to 360 should read 361.
Reference on page 226 to 216 should read 218.
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Reference on page 343 to 342 should read 344.
On page 127, Circular of Information (see page), should refer to 198.
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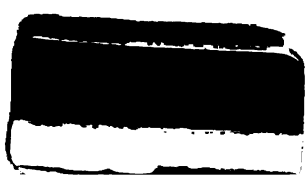

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